NP-1010/1020

SERVICE MANUAL

C A N O N

F Y 8 - 1 3 9 4 - 0 0 0

I. FEATURES

1. Fixed copyboard, yet with the zoom mechanism.
   · The copier can deal with documents as large as B4 in size (B4 → A4) and is the smallest fixed copyboard copier with the zoom mechanism.

2. Automatic density adjustment.
   · The copier automatically adjusts itself to suit the density of the documents for production of crisp copies.

3. 1% increment zoom mechanism in addition to fixed ENLARGEMENT and REDUCTION.
   · In addition to the fixed ENLARGEMENT/REDUCTION reproduction ratios, the copier is equipped with a zoom mechanism which allows enlargement/reduction in 1% increment between 70% to 122%.

4. Clam-shell type top.
   · The top of the copier is designed to open to provide free access in removing jams.

5. Cassette as well as manual feeding.
   · The copier comes with a cassette as standard, capable of holding 250 sheets of copy paper. In addition, with the manual feed mode, copies may be made on sheets as small as name cards or postcards.

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II. SPECIFICATIONS

Type	Body		Desk top
	Copyboard		Fixed
	Light source		Halogen lamp (230W)
	Lens		Zoom lens
	Drum		OPC
Configuration	Copying		Indirect electrostatic
	Charging		Corona
	Exposure		Slit (mobile light source)
	Copy density adjustment		Automatic (AE) or manual
	Development		Dry (black toner only)
	Paper feeding		Automatic or manual
	Separation		Curvature
	Cleaning		Blade
	Fixing		Heat roller (850W)
Performance	Document type		Sheet, book, 3-D object (2 kg max.)
	Document size		B4 max.
	Reproduction ratio		DIRECT, 2R2E, zoom (See Table 1-1.)
	Warm-up time		30 sec (approx. at 20°C)
	First copy		12 sec (at 20°C)
	Continuous copying		99 sheets max.
	Copying speed		See Table 1-1.
	Copy size		A4 max.; 51 mm X 88 mm min.
	Copy paper	Cassette	Plain paper (64 to 80 g/m2), tracing paper (SM-1), colored paper.
		Manual tray	Plain paper (64 to 128 g/m2), tracing paper (SM-1), colored paper, OHP film, postcard (cross feed), label, name card (200 g/m2 or less), onion paper (63 g/m2), high-quality paper (60 to 128 g/m2, coarse-grained paper (50 g/m2).
	Two-sided copying (manual only)		Plain paper (64 to 80 g/m2, colored paper, postcard (cross feed), name card (200 g/m2 or less), high-quality paper (60 to 128 g/m2), single copying operation for each side.
	Overlay copying (manual only)		Plain paper (64 to 80 g/m2, colored paper, postcard (cross feed), name card (200 g/m2 or less), high-quality paper (60 to 128 g/m2), two copying operations for each side.

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Performance	Cassette	Universal	Depth: 25 mm (about 250 sheets of 80 g/m2 paper) Width: A4/LGL (216 mm) to A5/Mini (139.5 mm) Length: A4/LGL (356 mm) to A5/Mini (210 mm)	
		A4	Depth: 25 mm (about 250 sheets of 80 g/m2 paper) Width: A4 (210 mm) Length: A4 (297 mm)	
	Manual tray		Width: A4 (210 mm) to name card (51 mm) Length: A4 (297 mm) to name card (51 mm)	
	Copy tray		20 sheets (approx.; A4 of 80 g/m2)	
	Non-image width		Leading edge: 2.0 +2.0, −1.5 mm Left/right: 0 +2.0, −0 mm	
Others	Operating environment	Temperature	5° to 32.5°C	
		Humidity	5% to 85%	
		Atmospheric pressure	0.6 to 1 atm.	
	Power supply	Voltage	Frequency	Serial No.
		220V	50Hz	DSD××××××
		240V	50Hz	ESD××××××
		240V	50Hz	FSD××××××
		220V	50Hz	KSD××××××
	Power consumption	Max.	1.2 kW	
	Noise	Copying	55 dB or less (1 m from machine)	
		Stand-by	42 dB or less (1 m from machine)	
	Ozone (average over 8 hr)		0.1 ppm or less	
	Dimensions	Width	506 mm (w/o tray)	
		Depth	471 mm	
		Height	288.5 mm	
	Weight		24.5 kg (body and cassette and tray)	
	Consumables	Copy paper	Keep wrapped to avoid humidity.	
		Drum unit	See CHAPTER 5.	

Mode	Reproduction ratio	Size	Copies/min
DIRECT	1 : 1 ±0.6%	A4 → A4	10
REDUCTION I	1 : 0.704 ±1.0%	B4 → B5, A4 → A5	10 , 10
REDUCTION II	1 : 0.813 ±1.0%	B4 → A4	10
ENLARGEMENT I	1 : 1.153 ±1.0%	B5 → A4	9
ENLARGEMENT II	1 : 1.223 ±1.0%	A5 → B5	9
ZOOM	0.70 ~ 1.22 ±1.0%	A4 → B5, B5 → A4	10 , 9

Table 1-1

Specifications are subject to change without notice for product improvement.

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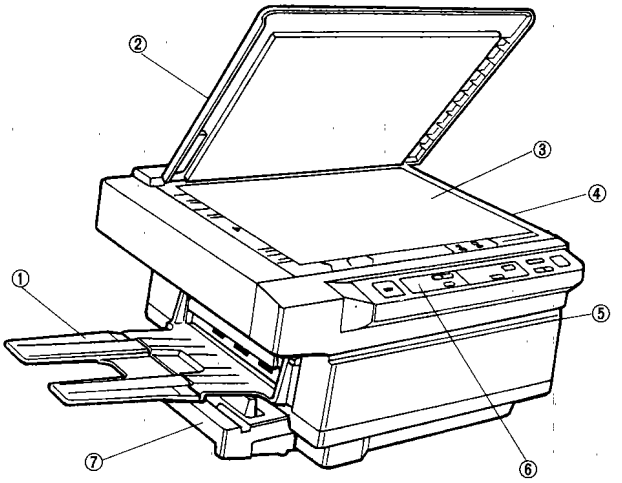
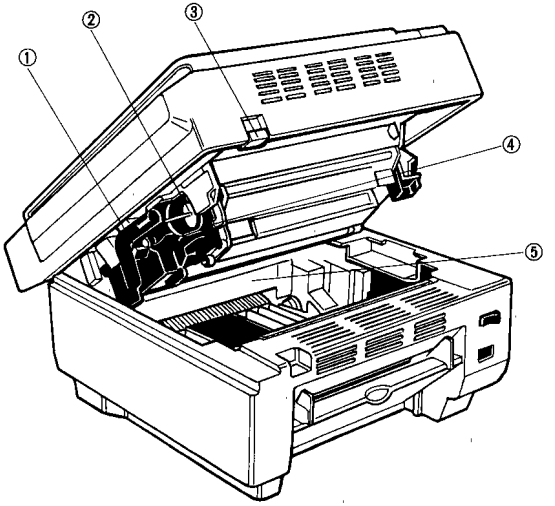
III. NAMES OF PARTS

A. External View



① Copy tray
② Copyboard cover
③ Copyboard glass
④ Power switch
⑤ Paper feed tray
⑥ Control panel
⑦ Cassette

Figure 1-1



① Drum unit
② Toner cartridge
③ Release lever
④ Developing unit
⑤ Fixing unit

Figure 1-2

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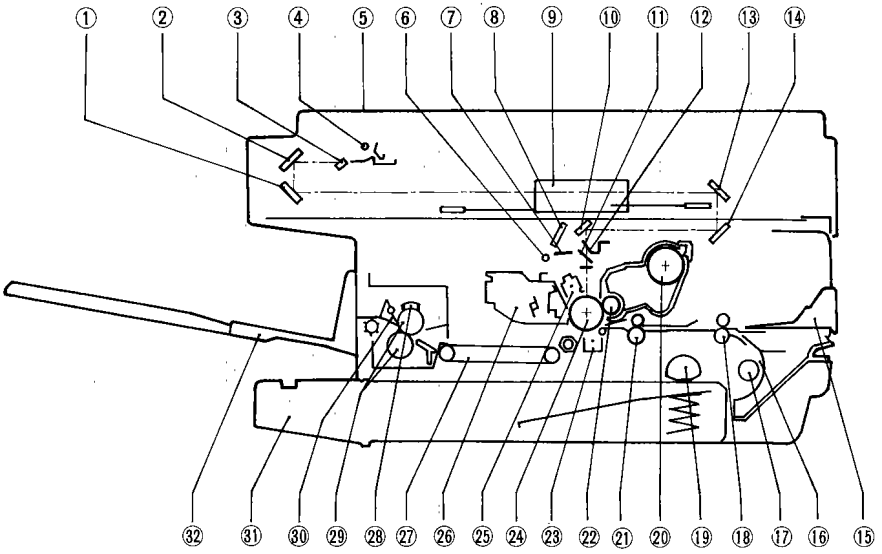
B. Cross-Sectional View



① Mirror 3
② Mirror 2
③ Mirror 1
④ Scanning lamp
⑤ Copyboard cover
⑥ Pre-conditioning exposure lamp
⑦ Reflector (for pre-conditioning exposure lamp)
⑧ Blank exposure lamp (front/rear)
⑨ Zoom lens
⑩ Mirror 6
⑪ Blank shutter
⑫ Reflector (for blank exposure lamp)
⑬ Mirror 4
⑭ Mirror 5
⑮ Manual feed guide
⑯ U-turn unit
⑰ Cassette feed roller
⑱ Manual feed/Cassette feed roller
⑲ Cassette pick-up roller
⑳ Toner cartridge
㉑ Registration roller
㉒ Developing cylinder
㉓ Transfer corona unit
㉔ OPC drum
㉕ Primary corona unit
㉖ Waste toner unit
㉗ Feeder unit
㉘ Fixing assembly cleaning unit
㉙ Fixing roller
㉚ Separation claw
㉛ Cassette
㉜ Copy tray

Figure 1-3

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IV. OPERATION

A. Control Panel

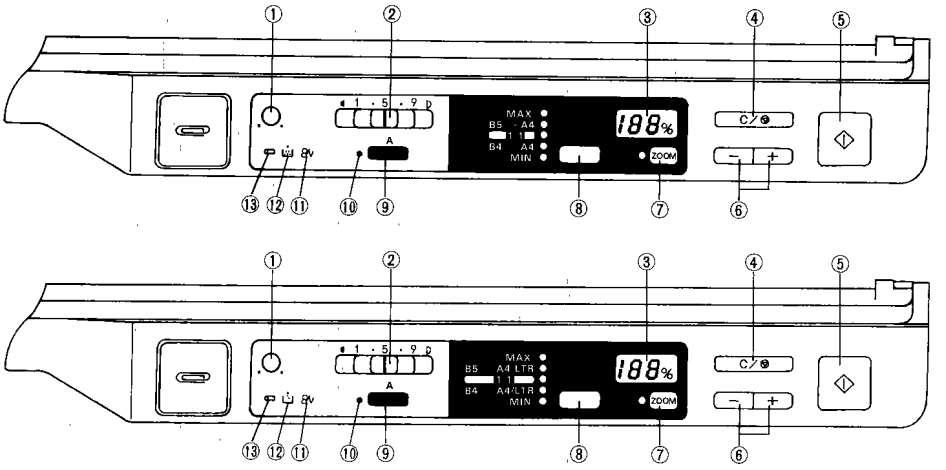

Figure 1-4

① DENSITY Correction Knob
- Use the knob to adjust the copy density in the automatic or manual density adjustment mode.

② EXPOSURE CONTROL lever
- Use the lever to darken or lighten the copy in the manual mode.

③ ZOOM/COPY NUMBER Indicator
- Set the number of copies to make, and press the key; the number will be displayed on the indicator. The number decreases for each copy made and returns to the initial number after all copies have been made.
- The indicator also displays "P" for feeding error or absence of paper and "E" for self diagnosis.
- Press the ZOOM key, and set the reproduction ratio desired; the ratio will be displayed on the indicator.

④ CLEAR/STOP Key
- Press the key to stop continuous copying; the operation will stop after completing the current copying cycle.
- Press the key to clear the display on the indicator in the standby mode; the copy count will return to '1', or the reproduction ratio will return to '100%'.

⑤ COPY START Key

⑥ ZOOM/COPY NUMBER INPUT Keys
- Use the keys to set the number of copies to make.
- With a press on the ZOOM key, a reproduction ratio may be between 70% and 122% in 1% increment.

⑦ ZOOM MODE Key
- Press the key to set a reproduction ratio other than those fixed.

⑧ REDUCTION/ENLARGEMENT Key
- Use the key to select DIRECT, ENLARGEMENT or REDUCTION.

⑨ AE Key
- Use the key to activate or deactivate the AE (automatic density adjustment) mode.

⑩ AE Indicator
- The indicator lights while the AE mode is in effect.

⑪ JAM Indicator
- The indicator flashes in response to a jam.

⑫ TONER OUT Indicator
- The indicator flashes when toner is running short.

⑬ DRUM UNIT Indicator
- The indicator flashes to advise replacement of the drum unit.

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B. Basic Copy Operation

1) Shift the power switch to 'I'.
   - If the temperature of the fixing assembly is below the specified value, the MAIN/WAIT indicator flashes at long intervals.
     If the COPY START key is pressed at the time, the indicator starts to flash at short intervals to indicate that copying will start as soon as the temperature reaches the specified value.
     If the COPY START key is not pressed, the indicator remains lit as soon as the temperature reaches the specified value to indicate that the copier is ready.
   - The copier normally needs about 30 sec to warm up (at 20°C).
2) Open the copyboard cover, and place the document face down aligned with the size index.
   - See Figure 1-5.

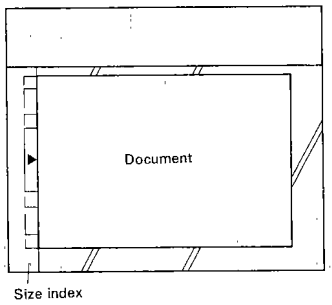

Figure 1-5

3) Press the A key if manual adjustment of the density is desired; use the exposure control lever to suit the density of the document.
4) Press the REDUCTION/ENLARGEMENT key or ZOOM MODE key as desired.
   - When the ZOOM MODE key is pressed, the ratio may be in 1% increment between 70% and 122%.
   - When the REDUCTION/ENLARGEMENT key is pressed, each press activates the reproduction ratios as shown in Figure 1-6.

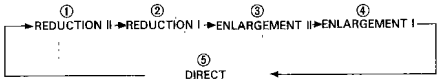

Figure 1-6

5) Check that the cassette is set in the cassette holder.
6) Press the COPY NUMBER INPUT key to set the number of copies to make (1 through 99), and check the number on the COPY NUMBER indicator.
7) Press the COPY START key.
   - Copying will not start while the MAIN/WAIT indicator is flashing; however, the COPY START key may be pressed at the time so that copying will start as soon as the copier is ready.
   - To stop continuous copying, press the CLEAR/STOP key. The copier stops after completing the current copy. The number on the indicator will be the one set initially.

Manual Feeding

1) Set a document on the copyboard.
2) Press the A key to clear the AE mode if manual adjustment of the density is desired; thereafter, use the EXPOSURE CONTROL lever to suit the density of the document.
3) Slide the guide on the manual tray to suit the size of the copy paper.
4) Feed the copy paper along the guide of the manual tray.
   - The copier starts automatically as soon as it detects the copy paper.
     The copy paper may be placed on the tray even while the MAIN/WAIT indicator is flashing; the paper will be fed into the copier, and copying will start as soon as the indicator stops flashing and remains lit.

Note:
Wait until the scanner has made a complete trip before feeding the second sheet of paper.

Two-Sided Copying

1) Make sure that the following conditions are met:
   - Turn over the copy paper, keeping its near and far edges oriented the same way for both sides.
   - The copy paper is not moist or curled.
   - The copy paper is 60 to 128 g/m2 in weight.
   - Each side of the copy paper is used for a single copy run only.
   - The copy paper has not been used for overlay copying.

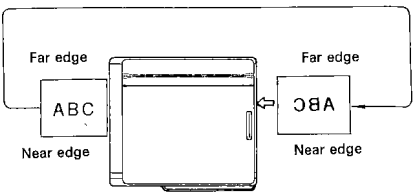

Figure 1-7

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C. JAM Indicator ON " "

When a jam occurs inside the copier, the JAM indicator goes ON. Perform the following to clear the jam.

- Do not tear off the paper; be sure no paper is left behind inside the copier.

1) Pull up the open/close lever, and open the copier.
2) Clear the jam.
   - If the jam is inside the fixing assembly, pull it farther inside.
   - If the jam is in the pick-up unit, pull it out in the feeding direction.
   - If the jam is in the delivery unit of the fixing assembly, open the delivery unit.
3) Close the copier carefully.

Note:
- Be sure to be quick in clearing the jam, and be sure that the drum is kept free of sunlight.
- Do not leave finger prints or scratches on the drum.

D. ADD PAPER Indicator ON " "

The ADD PAPER indicator goes ON in response to the following conditions:

- The cassettes have run out of paper.
- The COPY START key is pressed when there is no cassette in the cassette holders.
- When there is a jam in the U-turn unit.

1) Check if there is paper inside the cassette(s).
2) Set paper if there is no paper inside the cassette(s).
   If there is paper, perform the following:
   - Open the cover of the U-turn unit and look for a jam.
     Remove the jam, if any.
   - Remove the paper from the cassette(s), and arrange and re-set it.
   - Check if the cassette(s) is properly set in the cassette holder.
3) Press the COPY START key.
   - The indicator goes OFF, and the remaining number of copies will be made.

E. TONER OUT Indicator ON " "

The TONER OUT indicator goes ON when the toner starts to run short.

1) Open the upper unit.

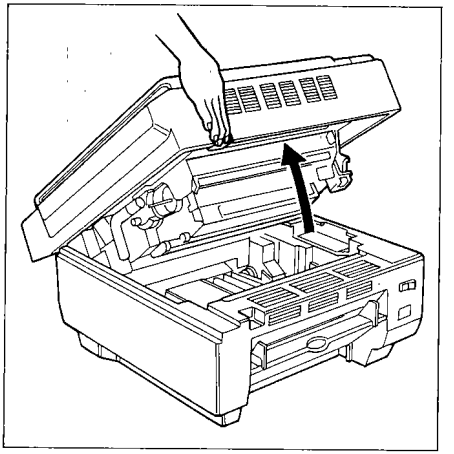

Figure 1-8

2) Turn the knob of the toner cartridge back and forth several times and then counter-clockwise (180 deg.), and pull the cartridge out to the front.

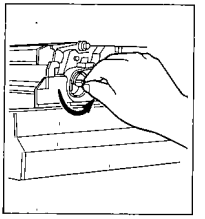

Figure 1-9

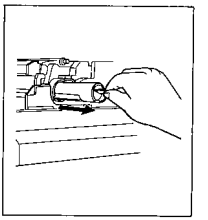

Figure 1-10

3) Shake the new toner cartridge vigorously side to side about ten times.

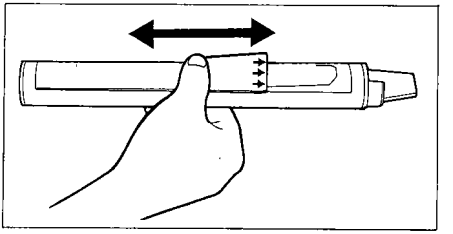

Figure 1-11

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4) Pick the tip of the seal, and insert the toner cartridge until it stops while peeling the seal.

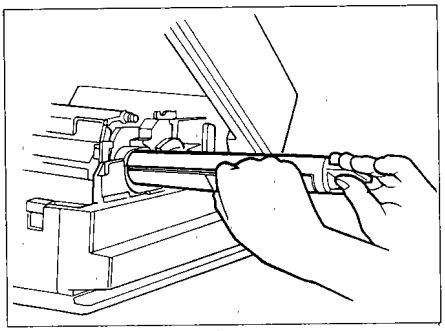

Figure 1-12

5) Pull and peel the seal toward the front with care.

6) Turn the knob of the toner cartridge clockwise until it stops.

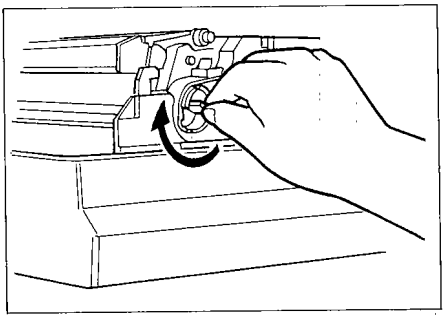

Figure 1-13

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F. Replacing the Fixing Assembly Cleaning Unit

Replace the fixing assembly cleaning unit when replacing the toner cartridge; replace the cleaning unit upon replacement of every two toner cartridges.

1) Remove the copy tray, and open the delivery unit.
2) Remove the used fixing assembly cleaning unit.
   - If the fixing roller is found to be soiled, clean it with a dry cloth.

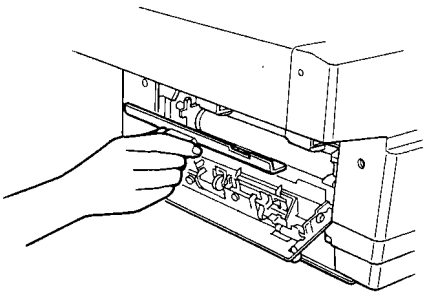

Figure 1-14

3) Mount the new fixing assembly cleaning unit.
4) Close the delivery unit, and mount the copy tray back on.

G. Density Correction Knob

If the density of copies seems to be too dark or too light in the automatic or manual density adjustment, turn the knob for optimum density. (Turn it clockwise to make the copies lighter.)

H. Cleaning

Advise the user to clean the following parts if images start to carry smudges.

Note:
- Be sure to be quick in clearing the jam, and be sure that the drum is kept free of sunlight.
- Do not leave finger prints or scratches on the drum.

(1) Copyboard glass and Copyboard cover.

Wipe them with a moist cloth, and then with a dry cloth; if dirt remains, wipe them with a solution of mild detergent, and then with a dry cloth.

(2) Primary corona wire.

Pull out and push in the primary corona wire cleaner (provided) several times to clean the wire.

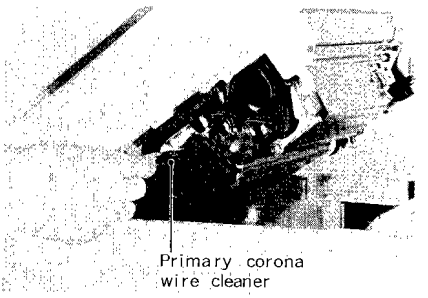

Figure 1-15

(3) Transfer corona wire.

Open the copier, and clean the transfer corona wire with a cotton-tipped stick.

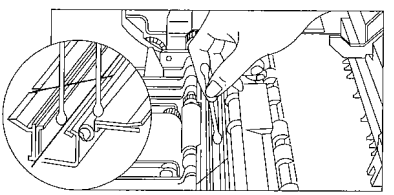

Figure 1-16

(4) Transfer guide.

Wipe the transfer guide with a well-wrung moist cloth.

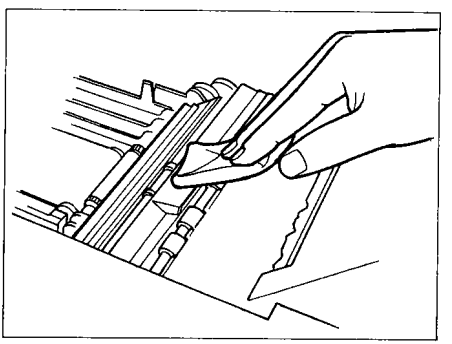

Figure 1-17

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(5) Static eliminator.

Open the copier, and clean the static eliminator (orange) with the brush attached to the tip of the cleaner (provided).

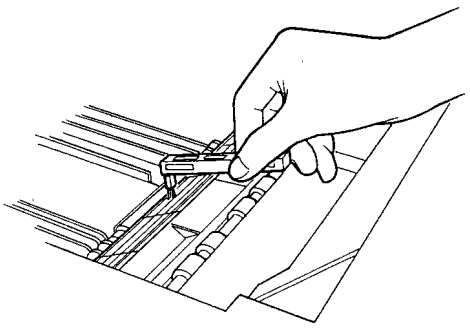

Figure 1-18

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I. IMAGE FORMATION PROCESS

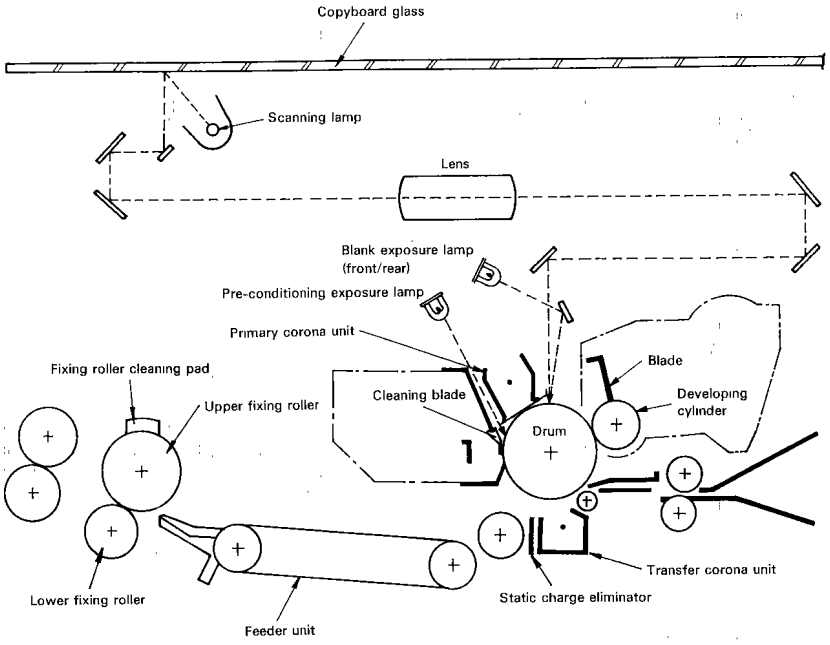

Figure 2-1

The copier is an electrophotographic copier equipped with a photosensitive drum. See Figure 2-1 for its construction.

The copier forms images in the following eight steps:

Step 1 Pre-conditioning exposure
Step 2 Primary corona (-)
Step 3 Scanning exposure
Step 4 Development (AC and DC biases)
Step 5 Transfer corona (-)
Step 6 Separation corona
Step 7 Fixing
Step 8 Drum cleaning

Figure 2-2 is a sequential diagram which shows how these steps involved in forming images are related to each other.

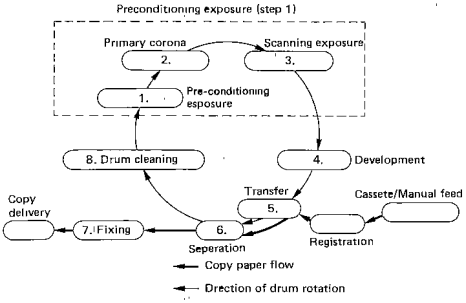

Figure 2-2

The photosensitive drum is of a two-layer construction; its outer layer is made of organic photoconductor (OPC), and the inner layer is an aluminum base made of conductor.

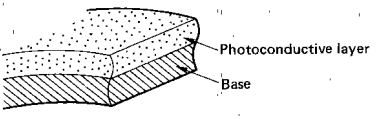

Figure 2-3

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1. Formation of Electrostatic Latent Image

This block consists of the first three steps of the image formation process; at its end, the areas of the drum corresponding to dark areas of the document are left with negative charges, and those representing light areas are rid of negative charges.

The pattern of charges so formed is not visible to the human eye and, therefore, is called an "electrostatic latent image."

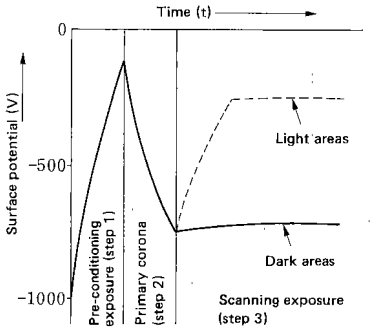

Figure 2-4

Step 1 Pre-conditioning exposure

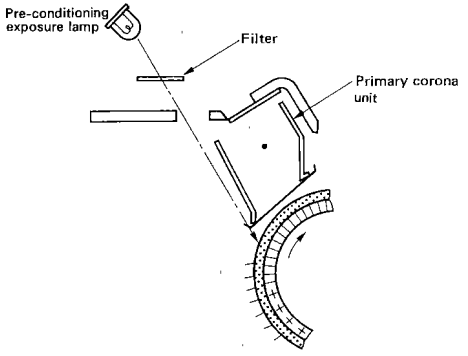

Figure 2-5

In this step, or pre-conditioning exposure, the surface of the drum is exposed to light from the pre-conditioning exposure lamp through a filter. All charges remaining on the surface of the drum from the preceding copy cycle are eliminated in preparation for exposure by the primary corona. Such charges, if left as they are, could result in copies with uneven density.

Step 2 Primary corona

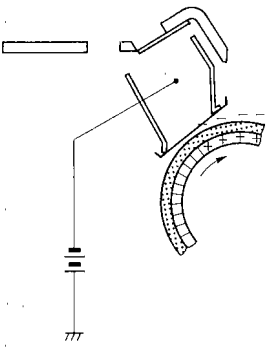

Figure 2-6

In this step, the drum is charged by the primary corona. Further, the drum is charged uniformly by the grid. As a result, its surface will come to have a uniform layer of negative charges and maintain primary potential.

Step 3 Scanning exposure

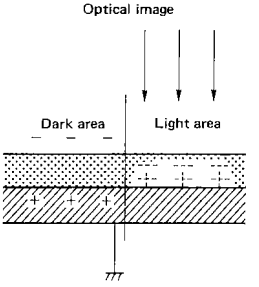

Figure 2-7

In this step, the optical image of the document is projected on the surface of the drum to neutralize the charges over areas meant to be light.

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Step 4 Development

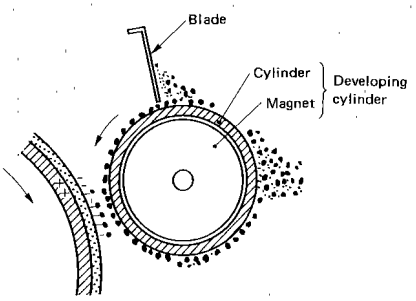

Figure 2-8

As shown in Figure 2-8, the developing assembly consists of a developing cylinder and a magnetic blade; the developing cylinder itself is made up of a magnet fixed in position and a cylinder which rotates around the magnet.

The black developer is a single-composition developer of magnetite and resin. The developer has insulating properties and is charged to a positive potential by friction against the rotating cylinder.

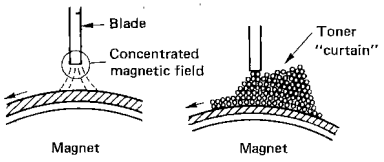

Figure 2-9

A concentrated magnetic field develops between the magnet and the tip of the blade, and the developer is attracted to the magnetic field.

The magnetic field holds the developer it has attracted virtually immobile and creates a collection of developer particles hanging from the tip of the blade. As the cylinder rotates, the developer particles leave the magnetic field to deposit themselves on the cylinder in a thin, uniform layer.

Since both the developing cylinder and the blade are given AC and DC biases (negative component) at the same time, the resulting wave form of the developing bias has a larger negative component than positive.

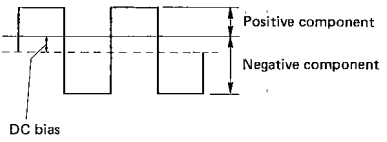

Figure 2-10

During development, the toner is attracted to the OPC drum by the work of the surface potential of the drum and the developing bias (at time of positive component) and turns the electrostatic latent image to a visible image. Excess toner is attracted back by the surface potential of the drum and the developing bias (at time of negative component).

The DC bias is known to affect copy density; the higher the DC bias, i.e., closer to 0V, the higher the density, but with an increased likelihood of fogging.

Step 5 Transfer

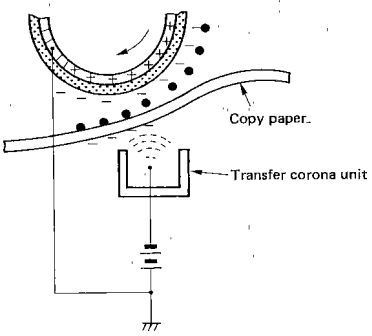

Figure 2-11

In this step, a negative corona is applied to the back of the copy paper so as to attract the positively charged toner to the copy paper.

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Step 6 Separation

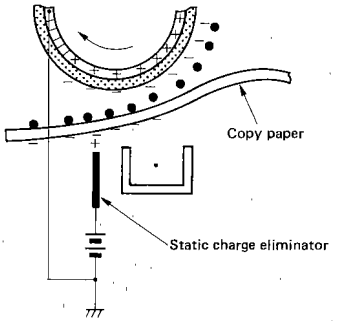

Figure 2-12

In this step, the copy paper is separated from the drum, making use of the body of the copy paper. To prevent copy paper without much body from remaining on the drum, a positive voltage is applied to the static charge eliminator, thereby weakening the attraction between the drum and the copy paper.

Step 7 Fixing

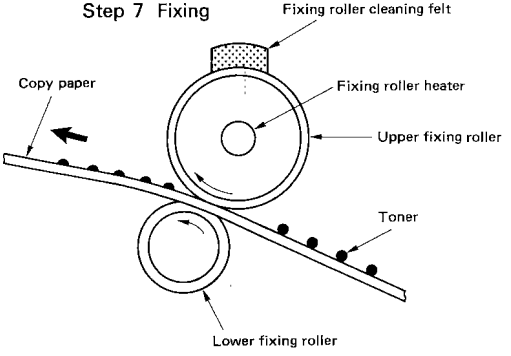

Figure 2-13

In this step, the copy paper carrying a transfer image moves between two heated rollers, and the transfer image is fused to the copy paper.

To prevent jams and toner offset, the upper roller remains in contact with a cleaning pad impregnated with silicone oil; the pad serves to apply a small amount of silicone oil as the roller rotates.

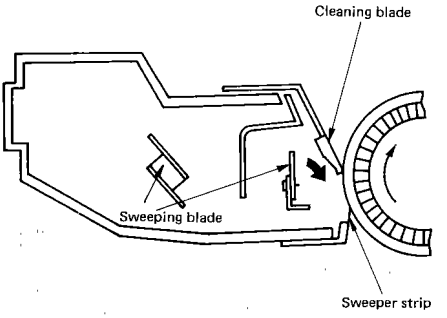

Figure 2-14

In this step, toner remaining on the drum surface is scraped off by the cleaning blade onto the sweeper strip. The toner is then moved to to the space at the rear of the cleaning unit by the sweeping blade.

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II. AUXILIARY PROCESSES

1. Blank Exposure Lamp

See p. 3-20.

2. Ozone Filter

The exhaust fan is equipped with an ozone filter, which breaks down the ozone generated by the coronas into oxygen by catalytic action.

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I. BASIC OPERATIONS

A. Functional Blocks

The copier can be divided into four functional blocks; i.e., paper pick-up/feed system, exposure system, image formation system, and control system.

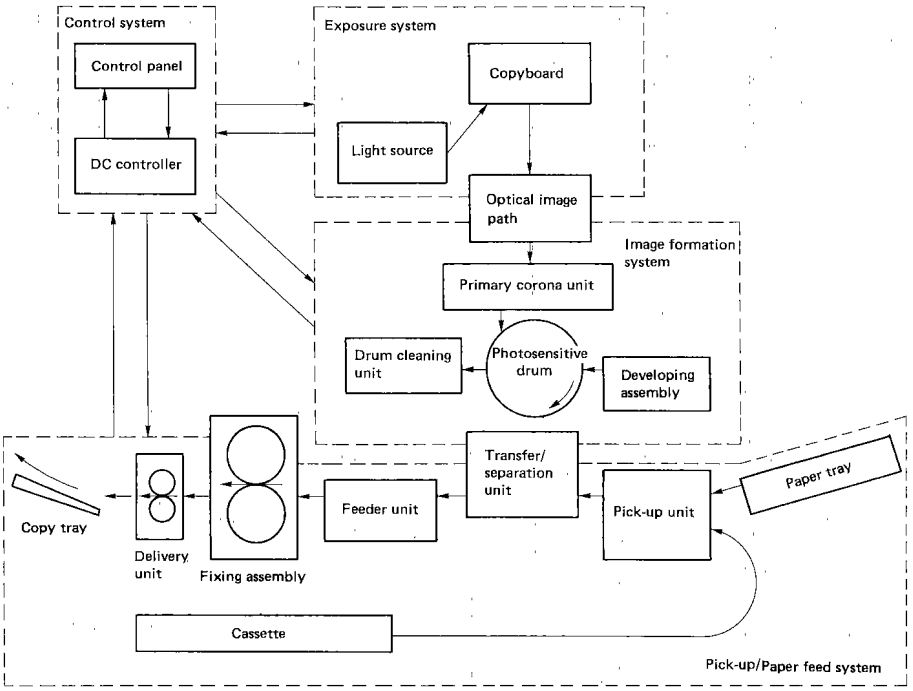

Figure 3-1

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B. Electrical Circuitry

The electrical operations of the copier are controlled by the microprocessor on the DC controller PCB. The microprocessor reads the input signals from the sensors and operation keys as instructed by the program stored in advance, and sends output signals as necessary to drive the motors, solenoids, lamps and other loads.

Note:
The microprocessor used by the copier is equipped with a built-in AD converter and, therefore, is capable of reading analog signals as well as digital signals. The signals bearing A in Figure 3-2 represent analog signals.

The main motor (M1) is a synchronous motor that uses the frequency of the power supply as its reference; the scanner motor (M2), on the other hand, is a stepping motor that runs on the frequency of the crystal oscillator inside the DC controller. Since fluctuations in the frequency of the power supply affects the rotation speed of the main motor (M1) but not the scanner motor, such fluctuations can lead to expanded or contracted images.

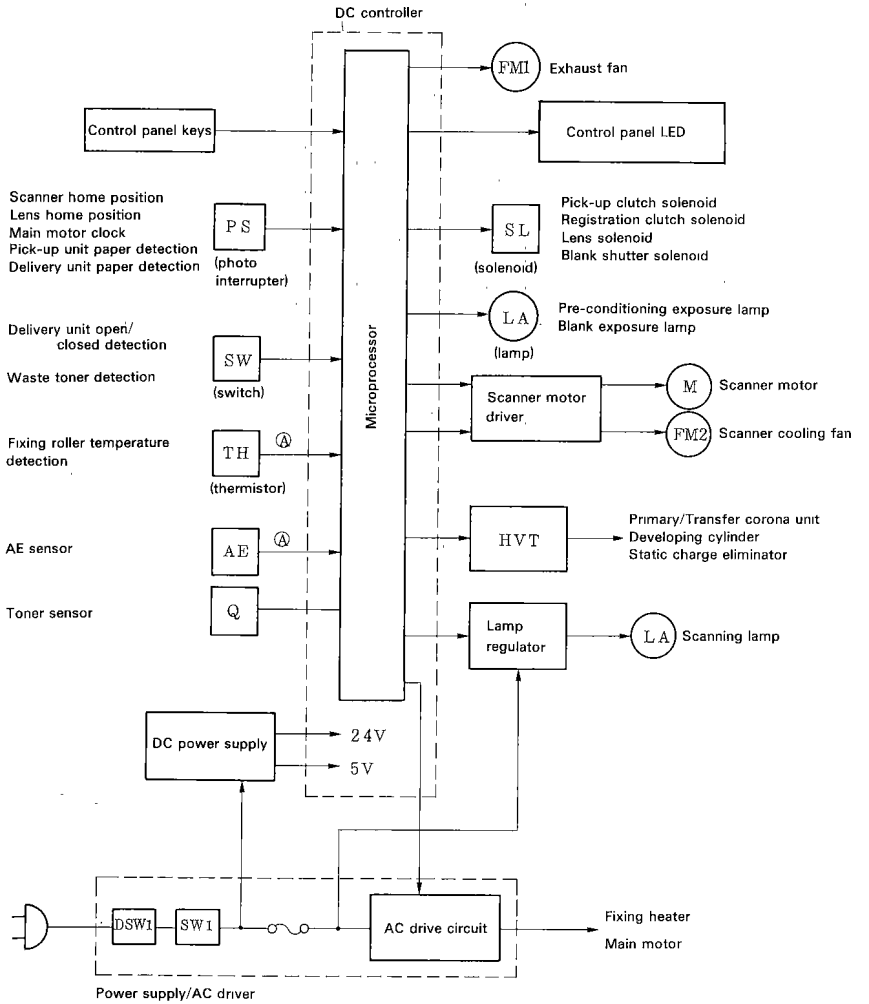

Figure 3-2

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C. Inputs to DC Controller

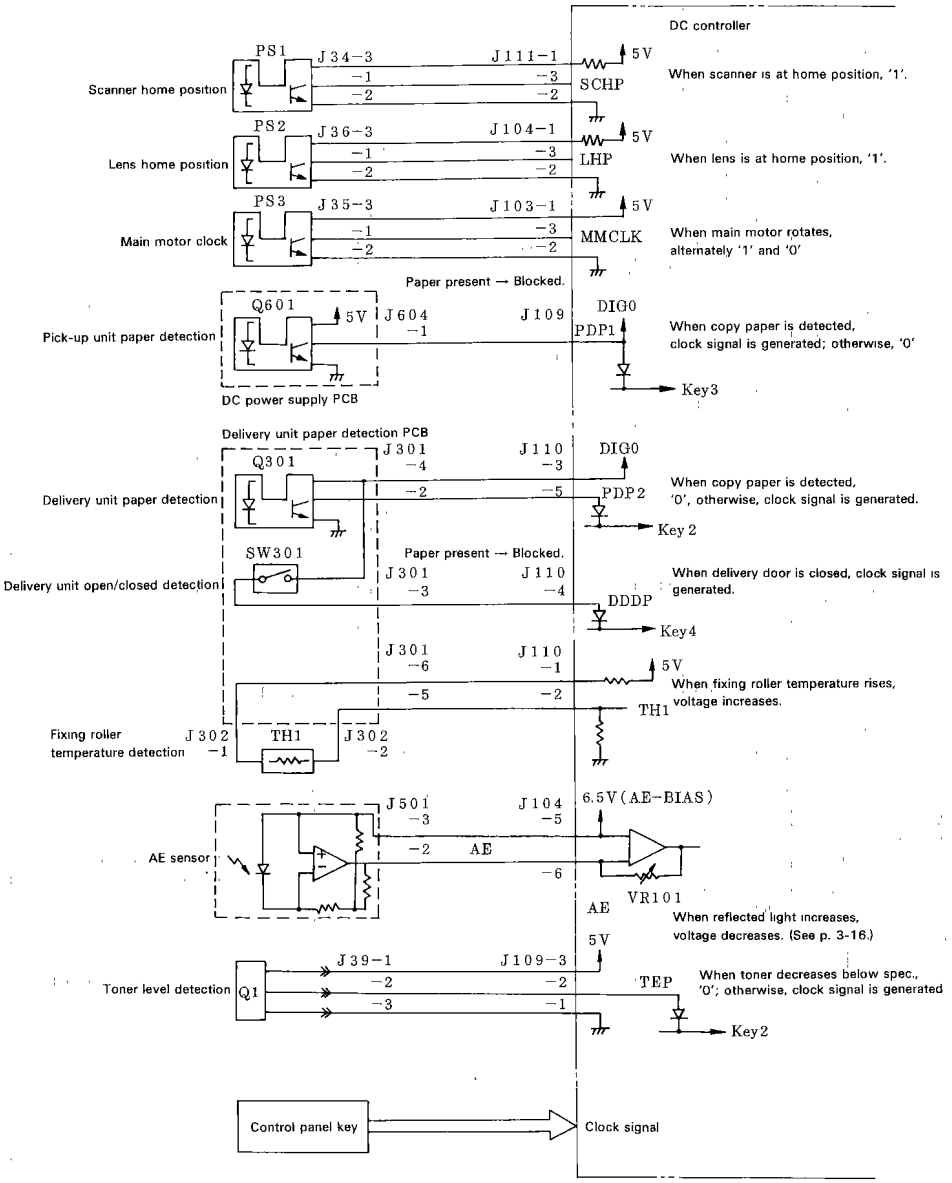

Figure 3-3

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D. Outputs from DC Controller

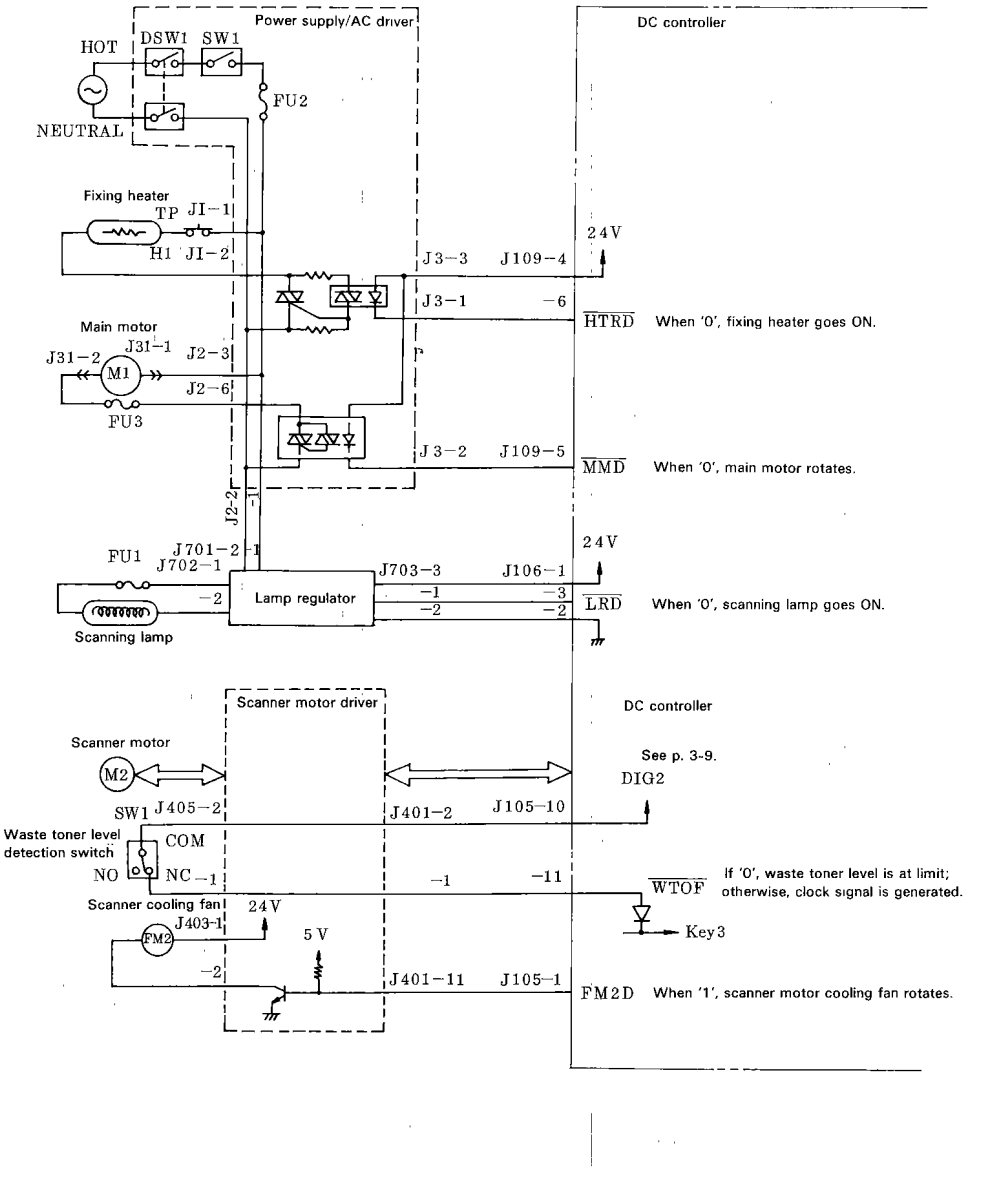

Figure 3-4

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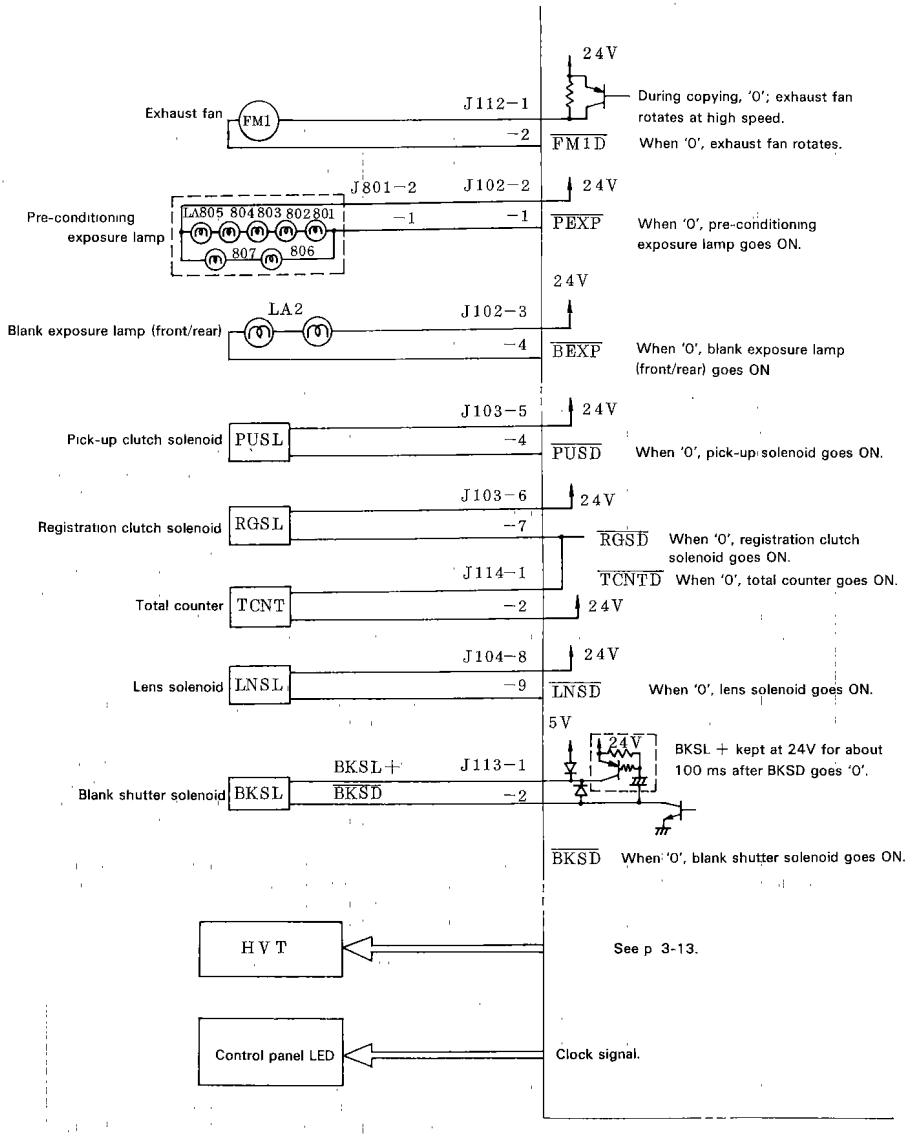

Figure 3-4A

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E. Basic Sequence (DIRECT, continuous copying)

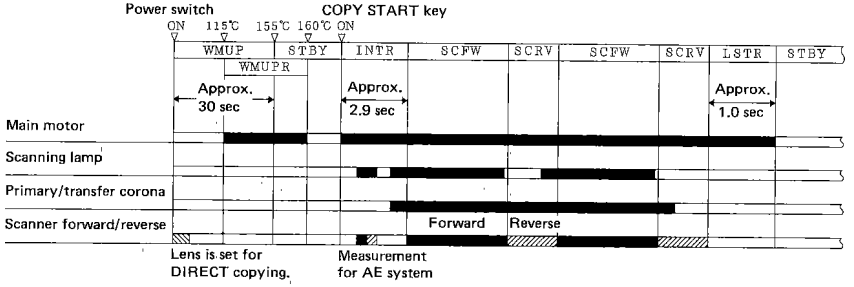

Figure 3-5

Signal	Period	Function	Remarks
WMUP (warm-up)	From when the POWER switch is turned ON to when the fixing roller temperature reaches 155°C (about 30 sec at 20°C).	Allows the fixing roller to heat.	The warm-up time differs depending on the fixing roller temperature at the time the POWER switch is turned ON. When WMUP is complete, the WAIT indicator stops flashing and remains lit.
WMUPR (warm-up rotation)	From when the fixing roller temperature has reached 115°C until it reaches 160°C.	Allows the fixing roller temperature to be uniform.	A press on the COPY START key during WMUPR while in STBY initiates INTR at once.
INTR (initial rotation)	For about 2.9 sec after the COPY START key is pressed	Allows the drum sensitivity to stabilize in preparation for copy operation. The scanner moves forward and in reverse about 12 cm and measures the density of the document when moving in reverse.	The scanner does not move forward and in reverse when in the non-AE mode. The pick-up signal is generated, and the first copy paper is picked up.
SCFW (scanner forward)	While the scanner moves forward. · The distance the scanner moves differs depending on the size of the copy paper and ratio of reproduction. · The speed at which the scanner moves differs depending on the ratio of reproduction.	Causes the scanning lamp to expose the document and the reflected light (optical image) to be projected on the drum through mirrors and lenses.	The registration signal is generated, and the copy paper is fed to the transfer unit.
SCRV (scanner in reverse)	While the scanner move in reverse. · The speed at which the scanner moves in reverse is 4.6 times that when it moves forward.	Causes the scanner to return to the home position in preparation for the next copy run.	The pick-up signal is generated, and the next copy paper is picked up.
LSTR (last rotation)	For about 1 sec after SCRV for the last copy is complete	Causes the last copy paper to be delivered.	
STBY (stand-by)		Keeps the copier ready for a press on the COPY START key.	

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II. EXPOSURE SYSTEM

A. Changing the Reproduction Ratio

The reproduction ratio across the drum is changed by the work of the lens drive system and that around the drum, by the scanner drive system.

To change the reproduction ratio across the drum, the lens drive system changes the position (focus point) of the lens as shown in Figure 3-6.

To change the reproduction ratio around the drum, the scanner drive system changes the speed of the movement of mirror 1 in relation to the peripheral speed of the drum; i.e., faster for reduction, and slower for enlargement.

Note:
1. In the NP-1010, mirror-to-mirror relocation is not used to change reproduction ratios.
2. In the direct copy mode, the speed of mirror 1 is identical to the peripheral speed of the drum.

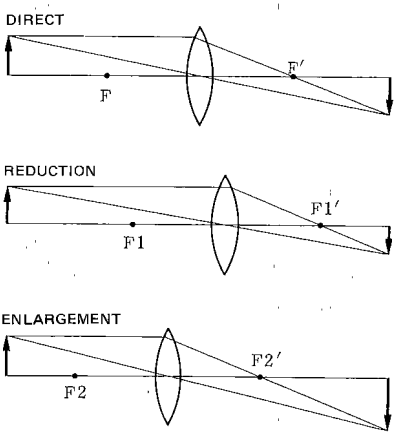

Figure 3-6

B. Lens Drive System

1. Outline

The lens is driven by the scanner motor (M2). When the lens solenoid (LNSL) goes ON, gear is pushed in the direction of ⇨; and, when the scanner motor rotates in reverse (➡) in this condition, the lens is moved for REDUCTION (➡) by the gear and lens cable.

The blank exposure lamp at the time also moves in relation to the distance over which the lens moves and exposes the section at front and rear as suited to the reproduction ratio for REDUCTION (black exposure). (See p. 3-20.)

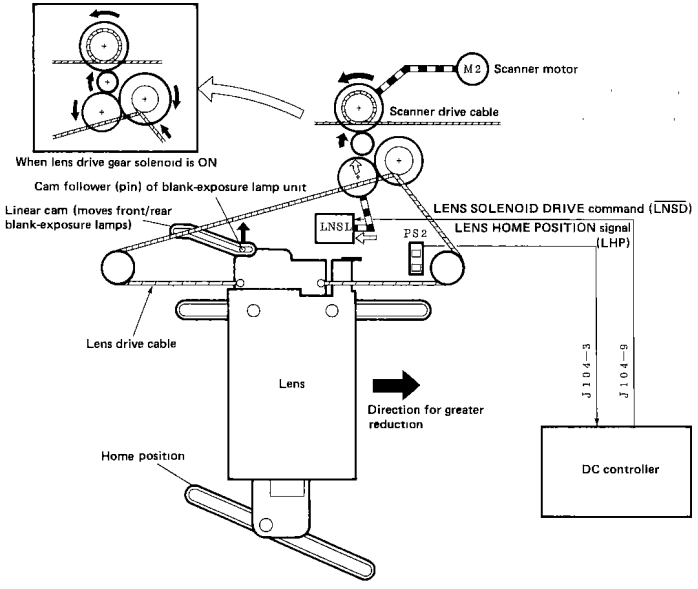

Figure 3-7

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2. Basic Sequence for Lens Drive System

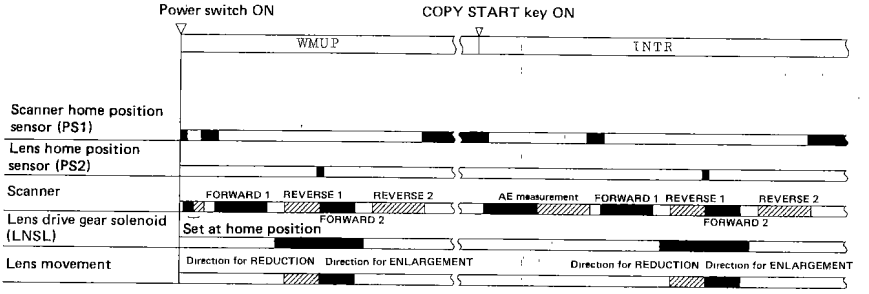

Figure 3-8

The lens is always set for DIRECT when the POWER switch is turned ON. If the COPY START switch is pressed with the reproduction ratio set for other than DIRECT, AE measurement is performed and, thereafter, the lens is moved to the ratio set.

Scanner (movement)	Lens (movement)	Function
Forward 1		The scanner is moved forward 120 mm* in preparation for movement in reverse 1.
In reverse 1	For REDUCTION	The lens is moved to the home position.
Forward 2	For ENLARGEMENT	The lens is moved to the position for DIRECT or position for the reproduction ratio selected.
In reverse 2		The scanner is returned to the home position.

Table 3-2

Note:
*The lens moves the greatest distance when initially positioned for the 122% reproduction ratio; in terms of the distance over which the scanner moves, it is about 120 mm.

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C. Scanner Drive System

1. Outline

The scanner is driven by the scanner motor (M2). The scanner motor changes its direction of rotation to move the scanner forward and in reverse. When the scanner moves forward, the speed at which the motor rotates changes to suit the reproduction ratio. The speed of the motor when the scanner moves in reverse, on the other hand, is constant regardless of the reproduction ratio (4.6 times that for forward movement).

The distance over which the scanner moves differs depending on the length of the copy paper and ratio of reproduction.

The scanner motor serves to drive the lens drive system as well as the scanner drive system. (See p. 3-7.)

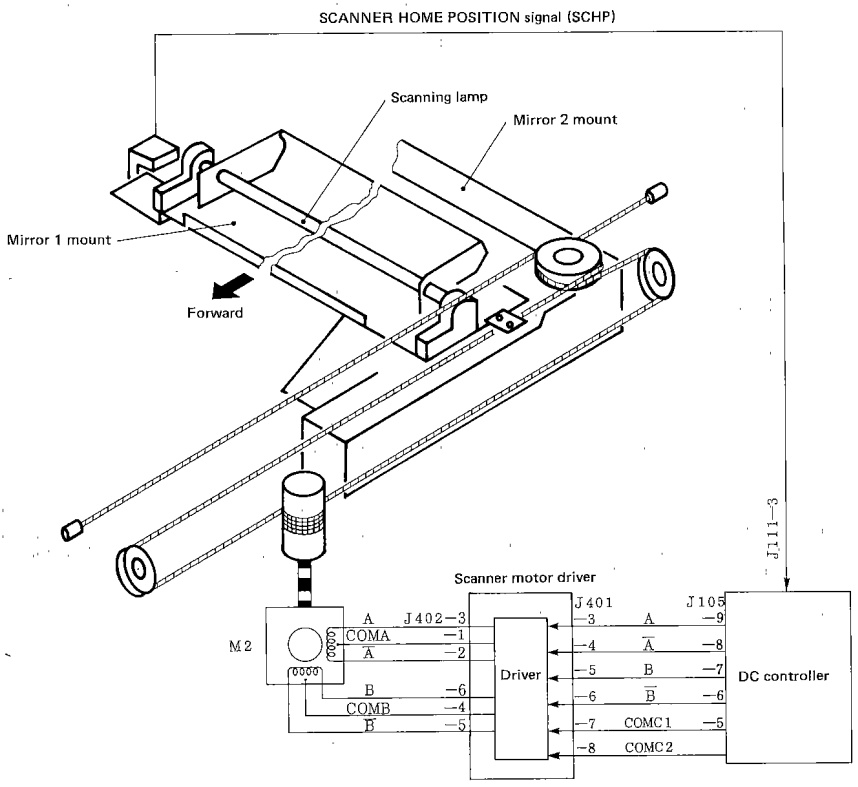

Figure 3-9

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2. Scanner Sensor and Signal

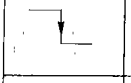
Scanner sensor	Signal	Scanner		Remarks
		Forward	In reverse	
PS1 (scanner home position)	SCHP			· Forward distance standard · Blank shutter solenoid ON · 0.1 sec thereafter, registration solenoid ON (variable by VR102)
				· 0.1 thereafter, scanner in reverse OFF

Table 3-3

3. Basic Sequence for Scanner

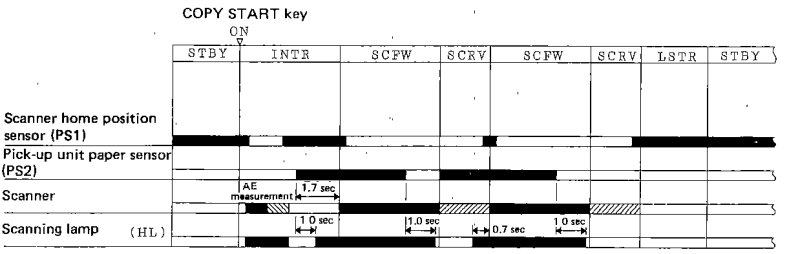


Figure 3-10 (no change in reproduction ratio)

The microprocessor on the DC controller controls the distance over which the scanner moves based on the falling edge of the scanner home position signal. Although the distance differs depending on the length of the copy paper* and ratio of reproduction, the scanner is moved forward for A4-size paper (297 mm) at least.

* For detection of the length, see p. 3-26.

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4. Electrical System

The scanner motor is a two-phase stepping motor and controls the direction and speed of rotation of the scanner motor by changing the sequence of pulses applied to each phase (A, $\overline{A}$, B, $\overline{B}$) and frequency.

- Movement in forward direction
  The scanner motor driver generates pulses as shown in Figure 3-11, and the motor rotates so that the scanner is moved forward. For REDUCTION, the pulses are generated at shorter intervals and the speed of rotation is increased.
- Movement in reverse direction
  The pulses are generated in reversed order, and the motor is rotated in reverse.

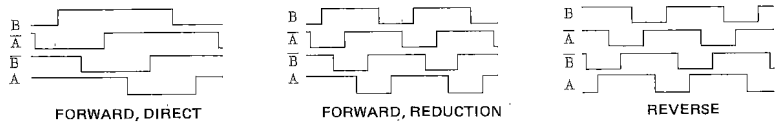

Figure 3-11

Note:
Scanner Motor and Prevention of Over-Heating

COMC1 and COMC2 are used to control motor drive currents COMA and COMB as shown in Table 3-4.

When the scanner moves forward, currents COMA and COMB are lower than when the scanner moves in reverse to prevent overheating of the motor.

COMA and COMB, further, are kept at about 0 A when the motor is at rest to limit heating. (See Figure 3-12.)

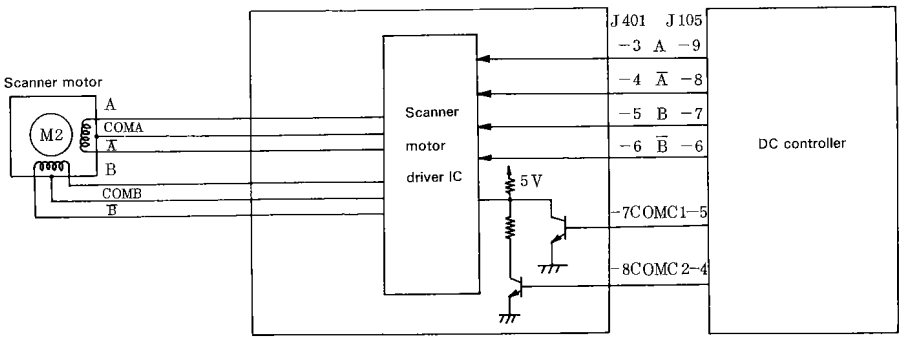

Figure 3-12

Scanner (movement)	COMC1 signal	COMC2 signal	COMA/COMB
Forward	0	1	0.45 A
In reverse	0	1	0.8 A
At rest	1		About 0 A

Table 3-4

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III. IMAGE FORMATION SYSTEM

A. Outline

The functions performed by the image formation system are as follows:

- Controls the scanning lamp
- Controls the primary/transfer corona current
- Controls the developing bias
- Measures the document density
- Controls the blank exposure

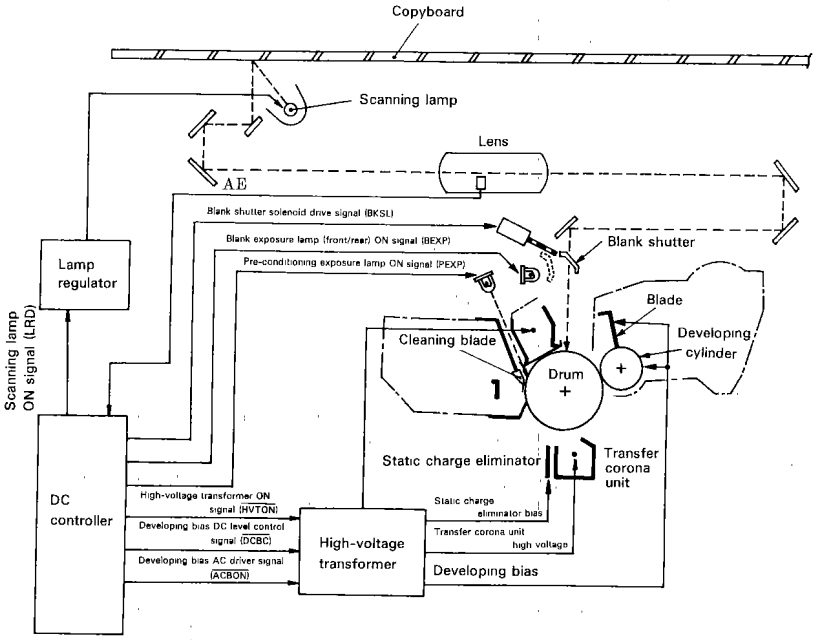

Figure 3-13

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B. Basic Sequence for Image Formation System

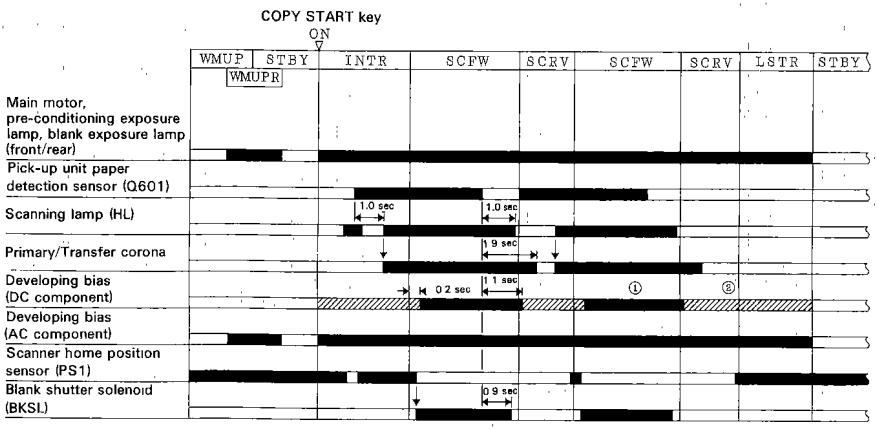

Figure 3-14

① Differs depending on the position of the COPY DENSITY lever and output of the AE sensor.
② Regardless of the above settings, a constant output of −500 V is generated to prevent toner from splashing off the developing cylinder to the drum.

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C. Controlling the Scanning Lamp

The circuit shown in Figure 3-15 serves to control the scanning lamp and has the following functions:

- Controls ON/OFF of the scanning lamp
- Maintains constant light intensity against power fluctuations

a. Controlling ON/OFF of the Scanning Lamp
When $\overline{LRD}$ is '1', the output of the lamp regulator switch circuit is '0'; this condition deprives the phase control circuit of power, and the triac circuit is OFF and, as a result, the scanning lamp is also OFF.
When the $\overline{LRD}$ is '0', the output of the lamp regulator is '1'; the phase control circuit is supplied with power, and the triac circuit goes ON and, as a result, the scanning lamp also goes ON.
Should the scanning lamp remain ON for 15 sec to 30 sec in the event the triac circuit fails, the relay is forced open to turn the scanning lamp OFF.

b. Controlling the Light Intensity of the Scanning Lamp
The power supply voltage fluctuation detection circuit converts the power supply voltage into a DC-level voltage and sends it to the phase control circuit. The phase control circuit, in response to the DC-level voltage, controls the triac circuit by deciding at which phase the circuit should go ON, thereby preventing changes in the light intensity due to fluctuations in the power supply voltage.

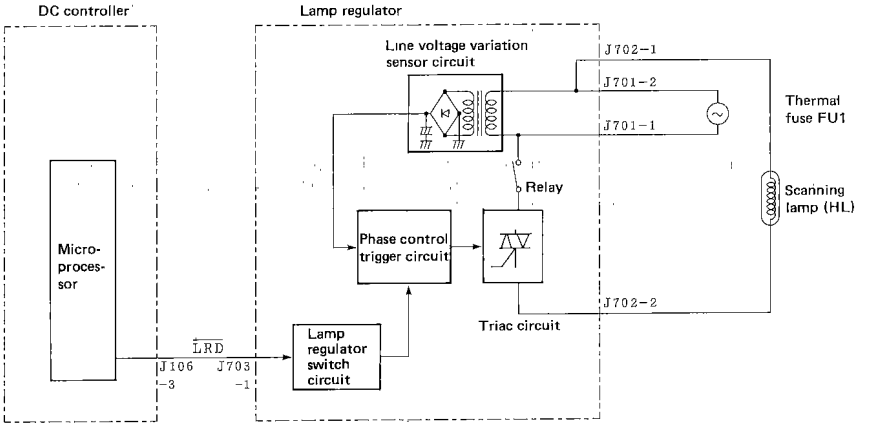

Figure 3-15

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D. Controlling the Primary/Transfer Corona Current

1. Outline

The circuit shown in Figure 3-16 serves to control the primary/transfer corona current and has the following functions:

1) Controls the ON/OFF of the primary/transfer corona current
2) Maintains constant current for the primary/transfer corona current

The output to the primary and transfer corona units is maintained at constant current so as to eliminate the effects of the environment on the corona discharge.

The ON and OFF of the primary/transfer corona current is controlled by the high-voltage output ON ($\overline{\text{HVTON}}$) signal.

2. Mechanism

a. When $\overline{\text{HVTON}}$ is '1',
Differential amplifier circuit is OFF,
Pulse width modulation oscillator is OFF,
High-voltage transformer is OFF.

b. When $\overline{\text{HVTON}}$ is '0',
Differential amplifier is ON,
Pulse width modulation oscillator is ON,
High-voltage transformer is ON.

The above sequence activates primary and transfer corona units.

The corona current of the primary corona unit is fed back to the differential amplifier by way of the shield plate and grid.

Should a corona current larger than the specified value flow from the primary corona unit because of changes in the environment, the level of the feedback signal to the differential amplifier circuit increases and the output thereof decreases; as a result, the corona current from the primary and transfer corona units decreases to keep the current constant at all times.

In the event an over-current flows on the output of the high-voltage transformer used in the primary and transfer corona units for some reason, limit control is activated so as to keep the current within the limit.

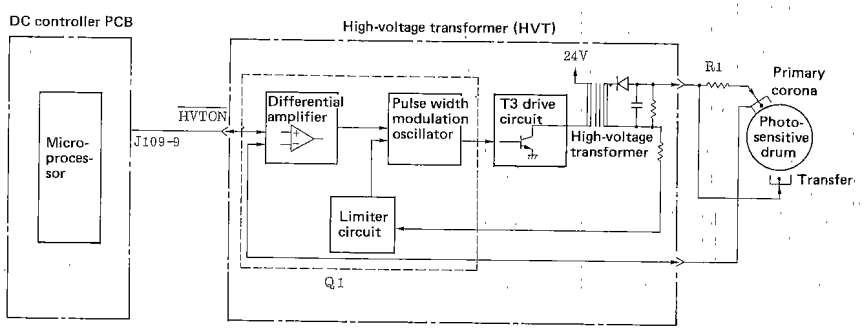

Figure 3-16 Primary Transfer/Corona Current Control Circuit

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E. Controlling the Developing Bias

1. Outline

The copier controls the copy density by varying the voltage of the developing bias (DC component) according to the following settings:

- EXPOSURE CONTROL lever (manual density control)
- AE sensor output (automatic density control)
- Density correction knob

Deterioration of the drum brings about shifts in the drum sensitivity and, such shifts, in turn, can produce foggy image. The problem can be corrected by changing the DC bias using the density correction knob.

Figure 3-17 shows changes in the developing bias (DC component) initiated by the exposure lever (manual density control), and Figure 3-18 shows changes in the developing bias (DC component) in the automatic density control.

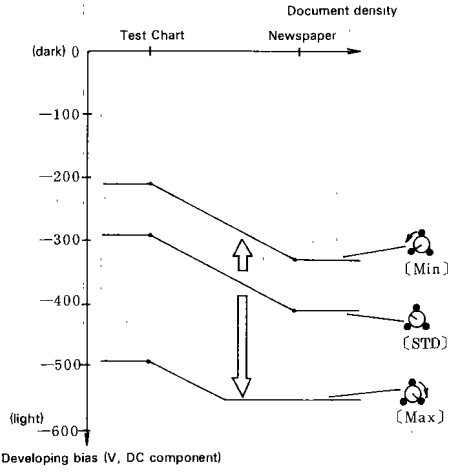

Figure 3-17 Manual Density Control

2. Mechanism

The circuit shown in Figure 3-19 serves to control the developing bias and has the following functions:

- Controls ON/OFF of the developing bias (AC component)
- Controls ON/OFF of the developing bias (DC component)
- Controls the voltage level of the DC bias according to the settings made by the copy density lever.

a. Controlling ON/OFF of the Developing Bias (AC component)

The square wave generation circuit remains activated as long as power is available.

- When $\overline{\text{ACBON}}$ is '1',
  AC bias switch circuit is ON,
  └Square wave generation circuit is OFF.
  This condition deprives the developing cylinder of the AC bias.
- When $\overline{\text{ACBON}}$ is '0',
  AC bias switch circuit is OFF.
  The above condition causes the output of the square wave generation circuit to be sent to the T1 drive circuit, increased to 1300 VAC, and sent to the developing cylinder.

The output of the AC high-voltage transformer, on the other hand, is rectified in the rectifier circuit and sent also to the static charge eliminator (about 3.0 kV).

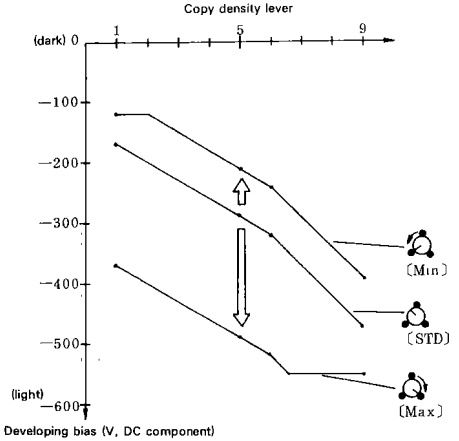

Figure 3-18 Automatic Density Control

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b. Controlling ON/OFF and Voltage Level of the DC Bias

Figure 3-19 illustrates the differential amplifier circuit, which is activated when the DCBC is 15V or less.

- DC Bias OFF
  DCBC is about 15 V,
  └Differential amplifier circuit is OFF,
  └Pulse width modulation oscillator is OFF,
  └DC high-voltage transformer is OFF.

The above condition deprives the developing cylinder of the DC bias.

- DC Bias ON
  DCBC is about 5 V to 15 V
  └Differential amplifier circuit is ON,
  └Pulse width modulation oscillator is ON,
  └DC high-voltage transformer is ON.

The above condition supplies the developing cylinder with the DC bias.
DCBC varies between 5 V and 15 V according to the setting of the copy density lever.

DCBC	15 V ~ 5 V
Developing bias (DC component)	−120 V to − 550 V

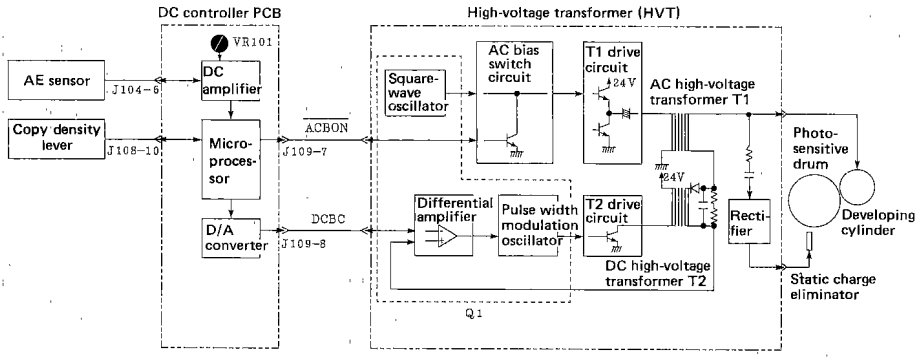

Figure 3-19 Developing Bias Control Circuit

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F. Measuring the Document Density

1. Outline

The copier is equipped with an automatic density control (AE) mechanism, which controls the DC component of the developing bias to suit the density of the document. As long as the document is uniform overall, copies free of fogging can be made by varying the DC component of the developing bias.

The AE sensor is mounted inside the lens unit and consists of a photodiode and operation amplifier.

2. Mechanism

During the initial rotation (INTR), the scanning lamp goes ON, and the scanner moves forward about 12 cm and reverses. The microprocessor on the DC controller, while the scanner moves in reverse, reads the output of the AE sensor 80 times at intervals of 1 mm. The area measured at the time is as shown in Figure 3-20.

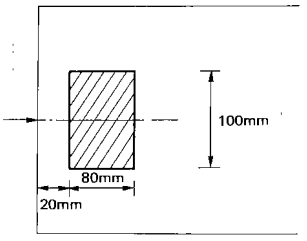

Figure 3-20 Area Measured

The microprocessor calculates the average of the density data of the 80 points and controls the DC component of the developing bias based on its result.

3. Adjustment

The following adjustment is performed when the DC controller or AE sensor is replaced.

1) Turn the power OFF, open the copier, and remove the drum unit.

Note:
- Cover the drum as soon as it is out of the copier to keep away from light.
- Do not leave finger prints or scratches on the drum.

2) Remove the upper front cover, and close the copier.
3) Turn the power ON, and open the delivery unit cover.
4) Place a blank sheet of paper (copy paper) on the copyboard, and close the document cover.
5) Hold the REDUCTION/ENLARGEMENT and ZOOM MODE keys down, and close the delivery unit cover.
- The copier enters the AE adjustment mode.
- The count is '00'.

6) Select the DIRECT copy mode, and press the COPY START key.
- The scanning lamp goes ON, and the scanner moves forward to the copy paper.
- The count indicates the output of the AE sensor read by the microprocessor.

7) Turn VR101 on the DC controller until the count is '55'.

Note:
The problem detection circuit of the lamp regulator will be activated if the scanning lamp remains ON for 15 to 30 seconds to turn the lamp OFF. If the lamp goes OFF before the count indicates '55', turn the power OFF and ON, and repeat step 3) and onward.

8) Press the CLEAR/STOP key.
9) Turn the power OFF and ON.

Note:
See Figures 3-21 and 3-22 for the relationship between the count indication and the input of the microprocessor or the DC component of the developing bias.

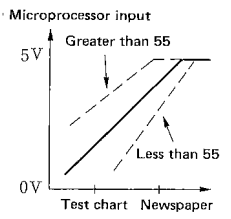

Figure 3-21

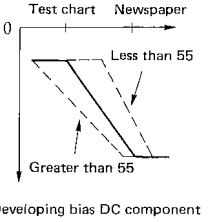

Figure 3-22

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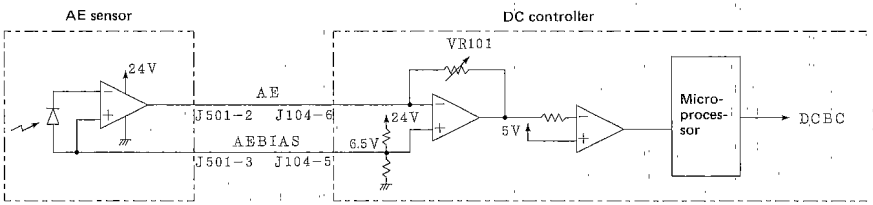

Figure 3-23 Document Density Measurement Circuit

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G. Controlling the Blank Exposure System

1. Outline

The copier performs blank exposure in two ways as described below to prevent excessive adhesion of toner on the drum.

- Blank Shutter

Except when the document is exposed, the light of the pre-conditioning exposure lamp is reflected against the blank shutter and led onto the drum.

- Blank Exposure (front/rear)

When the document is exposed for REDUCTION, the light of two fuse lamps (front and rear of blank exposure lamp) is led onto the drum.

2. Mechanism

a. Blank Shutter

- Document Not Exposed
  Blank shutter solenoid is OFF,
  Blank shutter is opened,
  Pre-conditioning exposure lamp not blocked.
- Document Exposed
  Blank shutter solenoid is ON,
  Blank shutter is closed,
  Pre-conditioning exposure lamp blocked.

Document not exposed

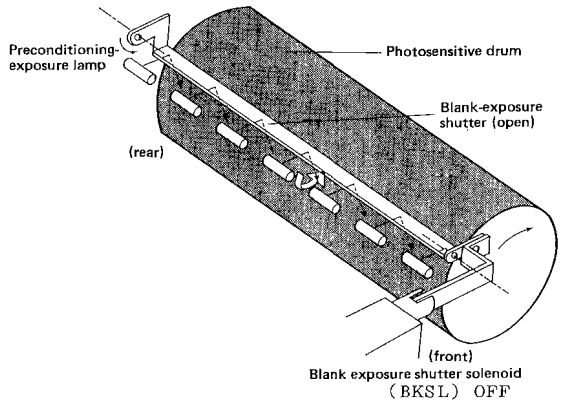

Figure 3-24

Document exposed

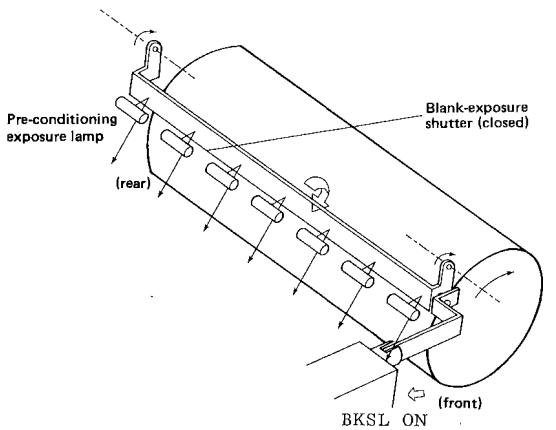

Figure 3-25

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b. Blank Exposure (front/rear)
The blank exposure lamp (front/rear) deals with the non-image area in the reduction mode (black erasure).
When in the reduction mode, the blank exposure lamp (front/rear) is moved to the direction of the arrow (Figure 3-26) the same distance over which the lens moves. The lamp, however, is not moved in the enlargement mode.

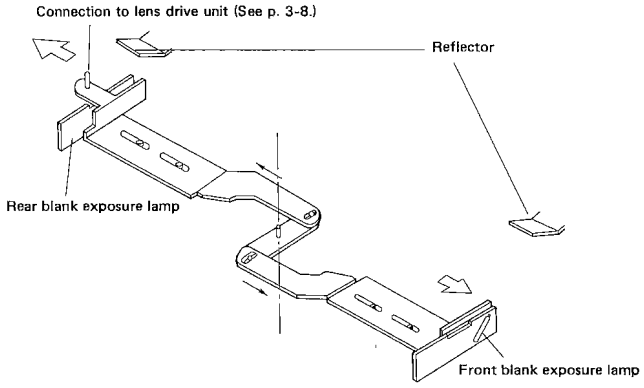
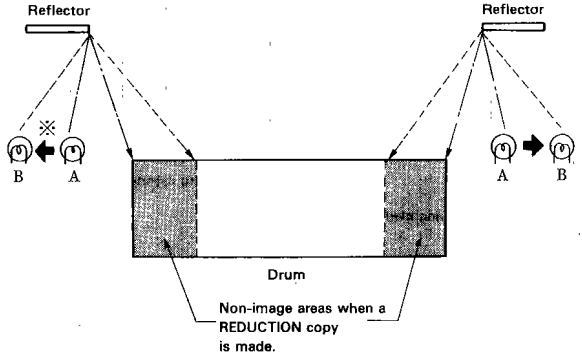


Figure 3-26



A: Position of blank exposure lamp in DIRECT and ENLARGEMENT.
B: Position of blank exposure lamp in REDUCTION.

* Movement of lamp from DIRECT to REDUCTION.

Figure 3-27

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H. Developing Assembly and Cleaning Unit

1. Outline

The developing assembly and waste toner sweeping blade are driven by the main motor by way of the drum gear.

The waste toner scraped by the cleaning blade is forwarded to and collected in the waste toner receptacle.

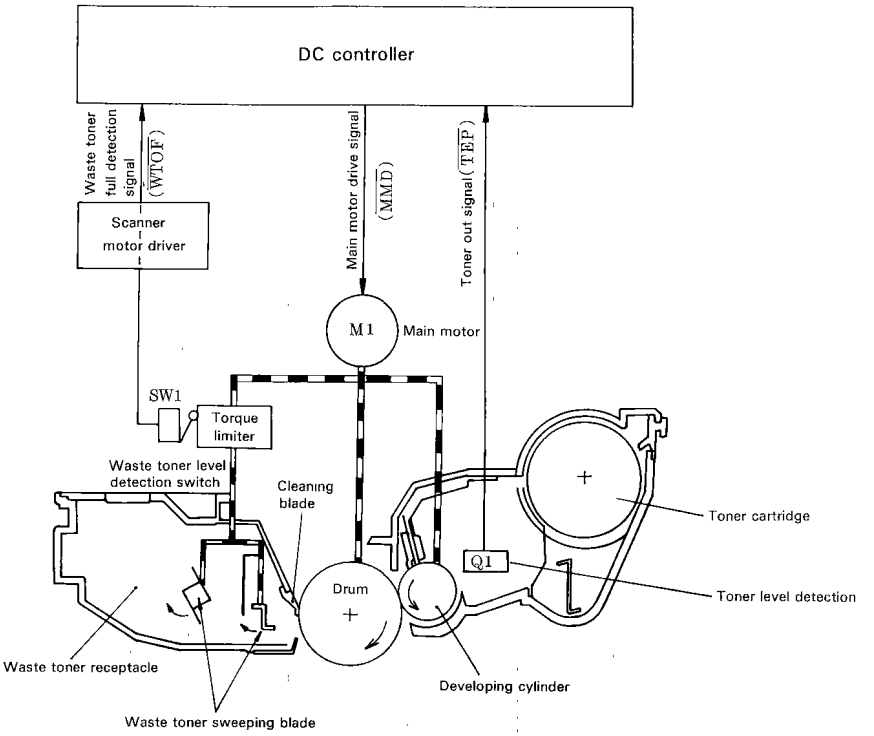

Figure 3-28

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2. Detection of Black Toner

The amount of toner inside the developing assembly is monitored by the toner level sensor (Q1); and the message ADD TONER will be displayed on the control panel when the toner falls below the specified amount.

a. ADD TONER Message

The message is displayed if the toner out signal (TEP) is present two seconds or more while in stand-by and the condition repeats four times in a row for each stand-by.
The count will be cleared, however, if the power is turned OFF or TEP = 0 does not last for two seconds for each stand-by.
When the ADD TONER message flashes, input from the keys on the control panel will not be accepted; turn the power OFF and ON again to reset the condition.

Note:
The toner sensor uses a piezoelectric oscillator, which oscillates at several kHz in the absence of toner, causing the sensor output to go '0'. In the presence of toner, the weight of the toner stops the oscillation of the piezoelectric oscillator, and the sensor output goes '1'.

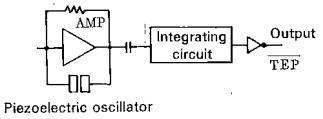


Figure 3-29

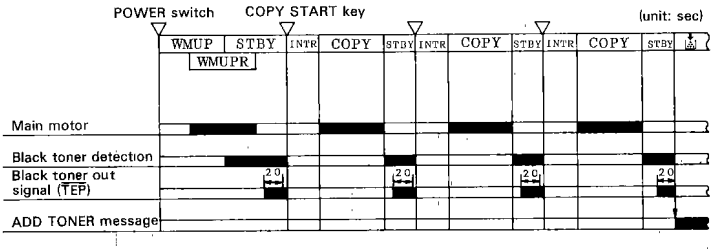
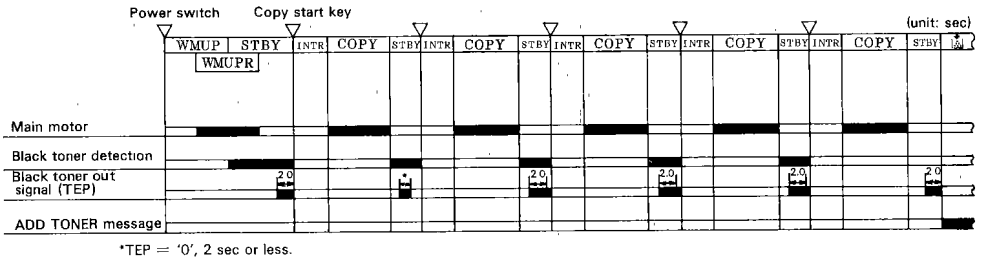


Figure 3-30 TEP = 0 Lasts Two Seconds or More During STBY Four Times in Succession



*TEP = '0', 2 sec or less.

Figure 3-31 TEP = 0 Lasted During STBY Less Than Two Seconds

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3. Detection of Waste Toner

Figure 3-33 shows a rear view of the drum unit.

The drum drive gear, which is driven by the main motor, is engaged with gear A to drive the gear. (See Figure 3-33.)

For transmission of drive to gear B, gear A is pressed by arm A in the direction of the arrow (⇨). (See Figure 3-33.)

The drive is then transmitted by gear B to the sweeping blade drive gear to rotate the blade. The waste toner scraped by the sweeping blade is thereby sent to the waste toner receptacle by the work of the sweeping blade.

When the waste toner unit becomes full of waste toner, the load imposed on the sweeping blade increases, and gear A rotates overriding the boss of gear B. (See Figure 3-34.)

When gear A overrides the boss of gear B, arm A is pushed up, and the waste toner detection switch is pressed by way of arm B (arrow ➡ in Figure 3-33).

At the time, ◎ mark on the control panel starts to flash.

Advise the customer to make a service call when this mark is ON.

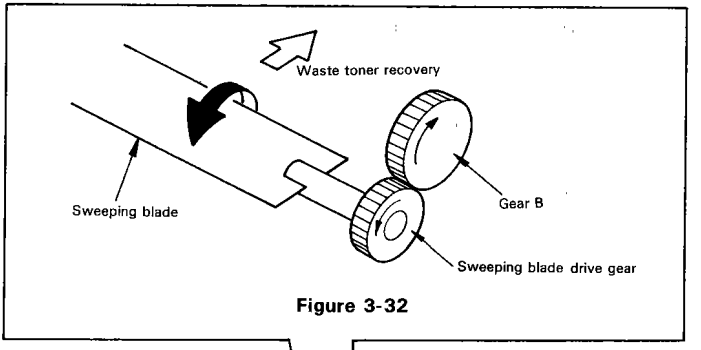

Figure 3-32

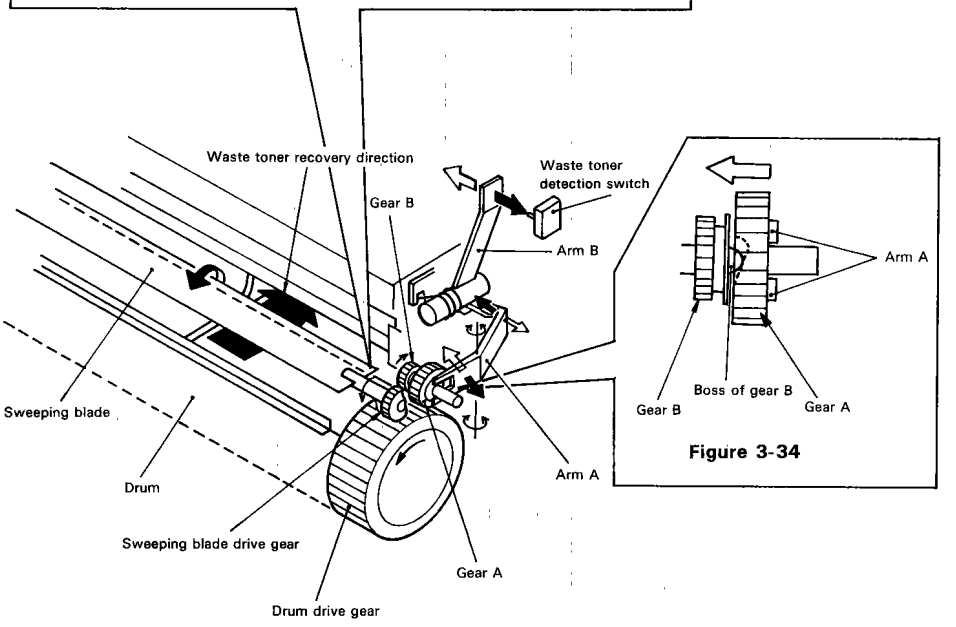

Figure 3-34

Figure 3-33 Drum Unit (rear view)

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IV. PICK-UP/FEED SYSTEM

A. Outline

When the pick-up clutch drive solenoid (PUSL) goes ON while the main motor (M1) rotates, the drive from the main motor is transmitted to the pick-up roller; the drive rotates the pick-up roller, and the copy paper is fed to the registration roller.

The copy paper is controlled by the registration roller so that its leading edge matches the leading edge of the image on the drum; thereafter, the copy paper is sent to the copy tray through the transfer, separation, and feeder units, fixing assembly, and delivery unit.

The copy paper is monitored by photointerrupters (Q601, Q301); and, if it fails to reach or pass the sensors within a specified time, the copier identifies the condition to be a jam. Upon such identification, the message JAM is indication on the control panel.

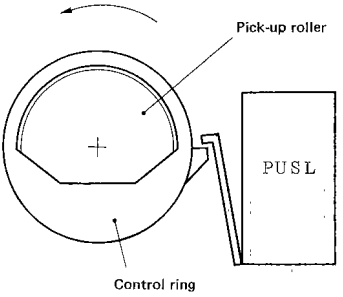

Figure 3-35

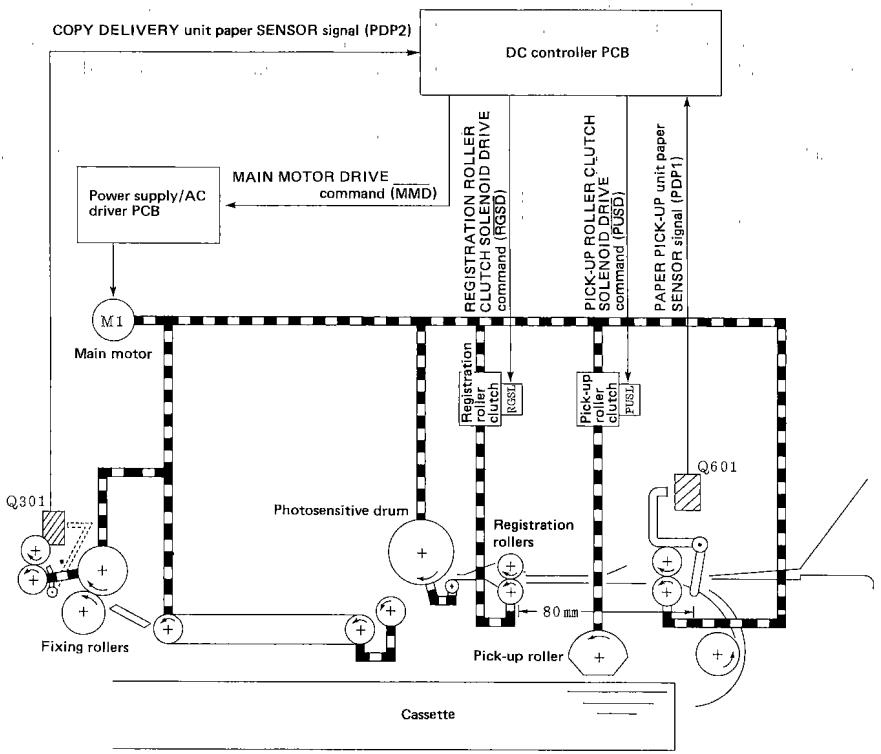

Figure 3-36

B. Sequence for Pick-up/Feed System

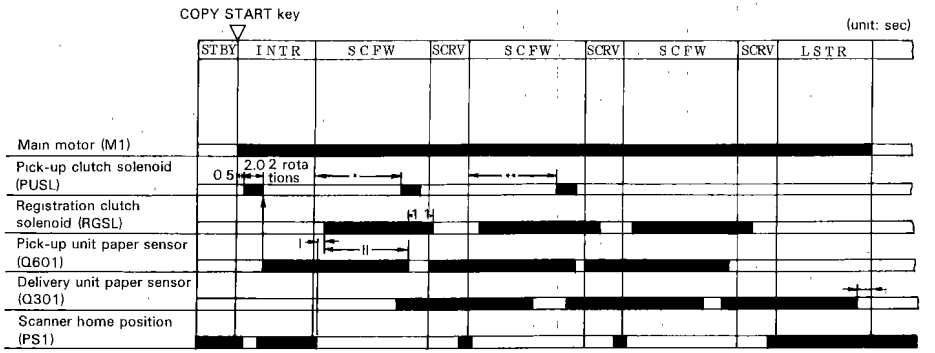

Figure 3-37

I: Variable by VR102 on DC controller (within about 9 mm; adjustment of leading edge registration).
II: Used for detection of copy paper length. (Applies only to 1st copy in continuous mode.)
Copy paper length (mm) = 72 (mm/s) × II (s) +80 (mm); where, 72 mm/s represents feed speed, and 80 mm represents distance between pick-up unit detection sensor and registration roller.

* Forced to 2.8 sec, as the length of the copy paper has not been detected.
** The pick-up clutch solenoid (PUSL) goes ON for the 3rd paper onward as follows, as the length of the copy paper has been detected:
- 2.8 sec at all times if paper is of a size larger than A4.
- 2.5 sec at all times if paper is of a size smaller than A4.

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C. Fixing Assembly and Delivery Unit

1. Outline

The upper and lower rollers of the fixing assembly and delivery roller are driven by the main motor (M1).

The upper roller is heated by the fixing heater (H1; 850 W), and rises in its surface temperature causes the resistance of the thermistor (TH) to decrease and the voltage of the fixing roller temperature detection signal (TH1) to increase.

The microprocessor on the DC controller controls the state of the fixing heater drive signal ($\overline{HTRD}$), to '1' or to '0'.

During copying ..... control at 185°C
In STBY ..... control at 160°C

For details, see Figure 3-39.

The copier is equipped with three protection mechanisms to prevent the fixing heater from going ON at the wrong time.

- The microprocessor monitors the voltage of TH1 and indicates 'E000' or 'E001' as necessary. (See p. 3-34.)
- If the voltage of TH1 exceeds 4.3 V (equivalent of 220°C), the fixing roller temperature detection circuit causes $\overline{HTRD}$ to go OFF regardless of the output of the microprocessor.
- If the temperature inside the thermoswitch exceeds 210°C, the thermoswitch goes OFF to cut the power to the fixing heater.

Note:
Once the contact of the thermoswitch (TP) opens, the thermoswitch is not used again unless cooled to 0°C or below. (The contact of the thermoswitch will not recover at room temperature.)

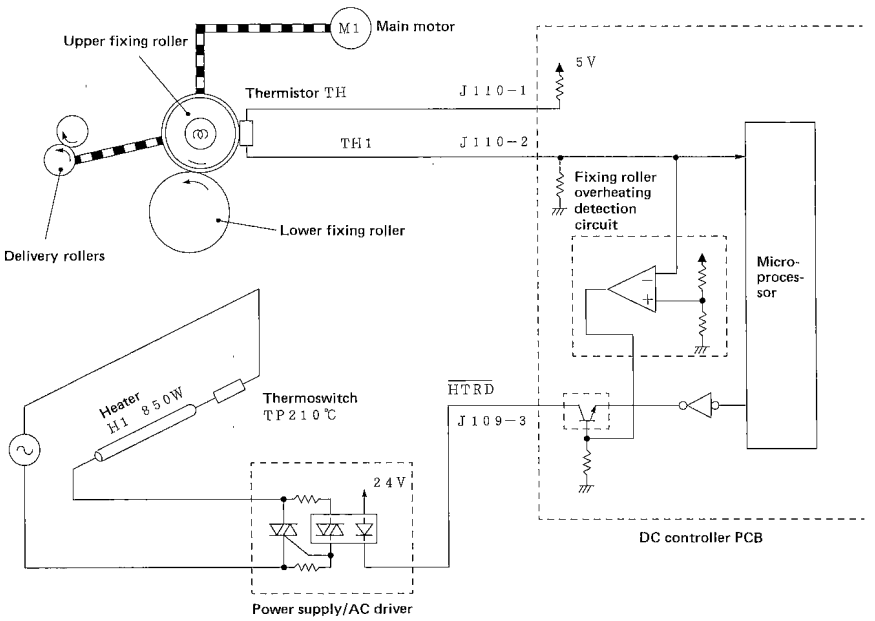

Figure 3-38

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2. Operations Related to Fixing Assembly

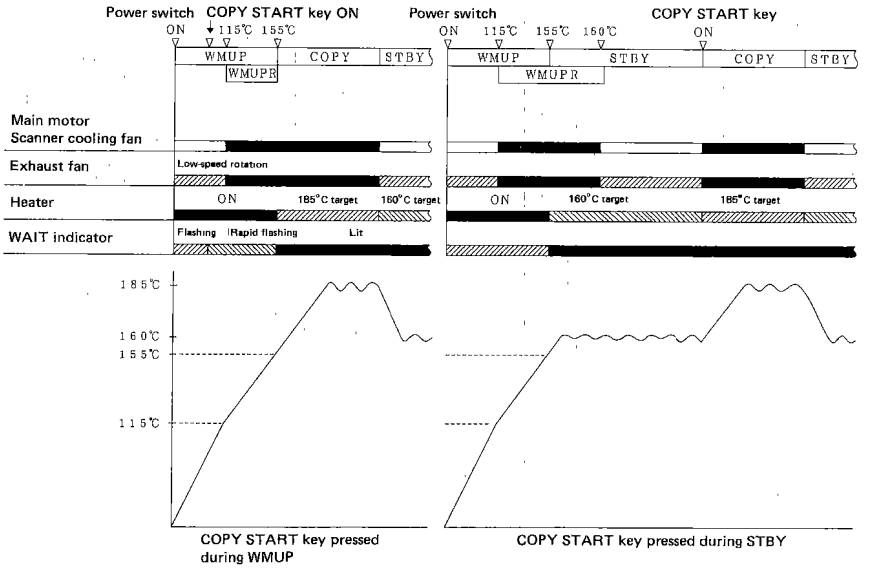

Figure 3-39

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D. ADD PAPER/JAM

The copier is equipped with two sensors to detect the presence and absence of copy paper and to monitor whether the copy paper is fed normally.

- Pick-up unit paper sensor (Q601)
- Delivery unit paper sensor (Q301)

To detect the presence and absence of copy paper, or jam, the microprocessor checks the state of the sensors in response to the instructions stored in advance.

The copier is not designed to store the remaining number of copies at time of a jam or copy mode; as such, the settings are returned to standard when the copier is opened and closed for removal of jams.

The microprocessor performs the following five ADD PAPER/JAM sequential operations and, in addition, it identifies a jam if the sensor detects copy paper when the POWER switch is turned ON.

1 No First Paper (pick-up delay jam)

If the first copy paper fails to reach the pick-up unit paper sensor within the specified time (no cassette in the copier or no paper in the cassette), an ADD PAPER condition is identified and the main motor stops 0.5 seconds thereafter and the message ADD PAPER is indicated. If the sensor detects copy paper before the 0.5-second period, a pick-up delay jam is identified and the message JAM is indicated.

This ADD PAPER/JAM detection is not performed in the manual mode.

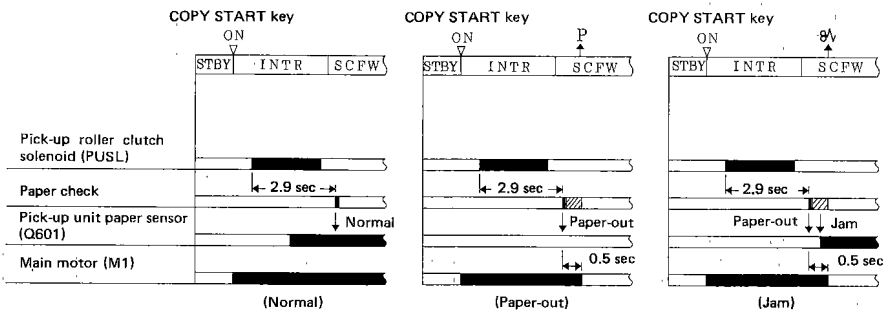

Figure 3-40

2 No Second Paper (pick-up delay jam)

If the second or following copy paper fails to reach the pick-up unit paper sensor within the specified time (no paper in the cassette), an ADD PAPER condition is identified, and the main motor stops 0.5 seconds after the delivery unit paper sensor goes OFF and the message ADD PAPER is indicated. If the pick-up unit paper sensor detects copy paper after an ADD PAPER condition is identified and before the main motor stops, a pick-up delay jam is identified and the message JAM is indicated (flashing).

This ADD PAPER/JAM detection is not performed in the manual mode.

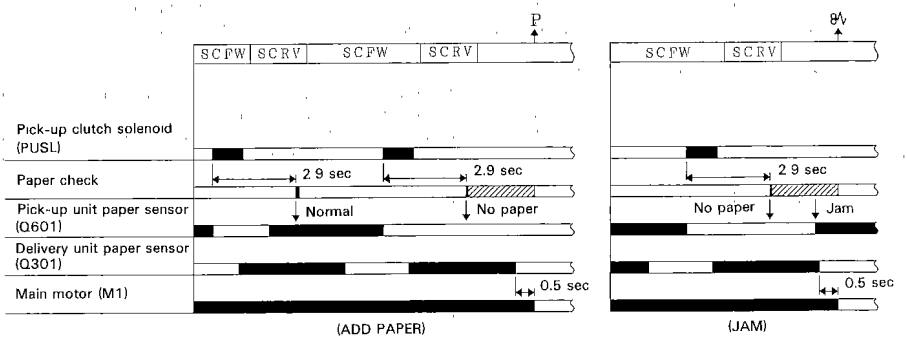

Figure 3-41

3 Pick-Up Stationary Jam

If the copy paper fails to pass the pick-up unit paper sensor within the specified time (faulty feed), an pick-up stationary jam is identified, the copier is stopped at once, and the message JAM is indicated (flashing).

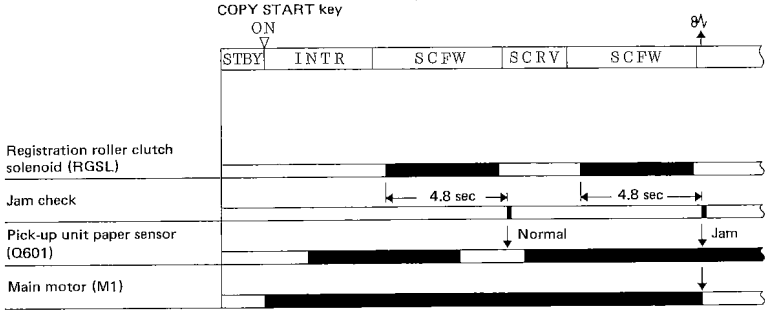

Figure 3-42

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4 Delivery Delay Jam

If the copy paper fails to reach the delivery unit paper sensor within the specified time, a delivery delay jam is identified, the machine is stopped at once, and the message JAM is indicated (flashing).

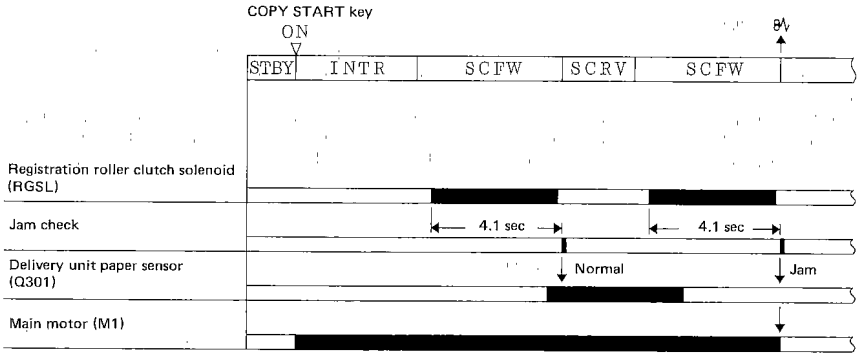

Figure 3-43

5 Delivery Stationary Jam

If the copy paper fails to pass the delivery unit paper sensor within the specified time (faulty feed), a delivery stationary jam is identified, the copier is stopped at once, and the message JAM is indicated (flashing).

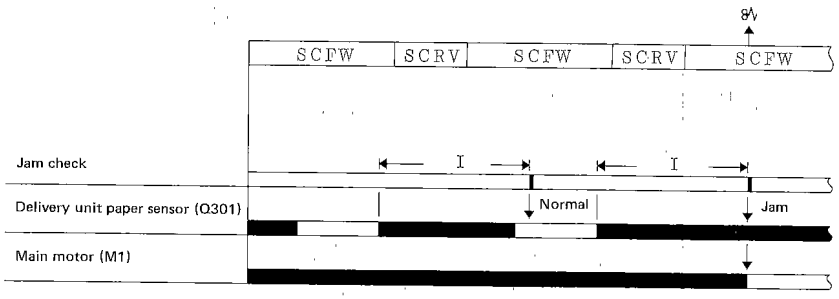

Figure 3-44

$$I = \frac{\text{Copy paper length (mm)}}{72\ \text{(mm/s)}} + 0.6\ \text{(s)}$$ See page 3-21 for copy paper lengths.

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V. POWER SUPPLY

A. Power Supply

The DC power supply is supplied with AC power as soon as the door switch and POWER switch are turned ON; the DC power supply, in turn, generates 24 VDC and 5 VDC.

B. Protection Mechanism for Power Circuit

The DC power supply circuit is of a switching regulation type; and, if an over-current flows because of a short circuit (problems in loads), the protection mechanism is activated and stops the output.

When the output stops, it can be started by turning the POWER switch OFF, correcting the problem in the load, and turning the POWER switch ON once again. Repeated short-circuiting of the load(s) and repeated re-setting can cause the fuse built inside the DC power supply to melt.

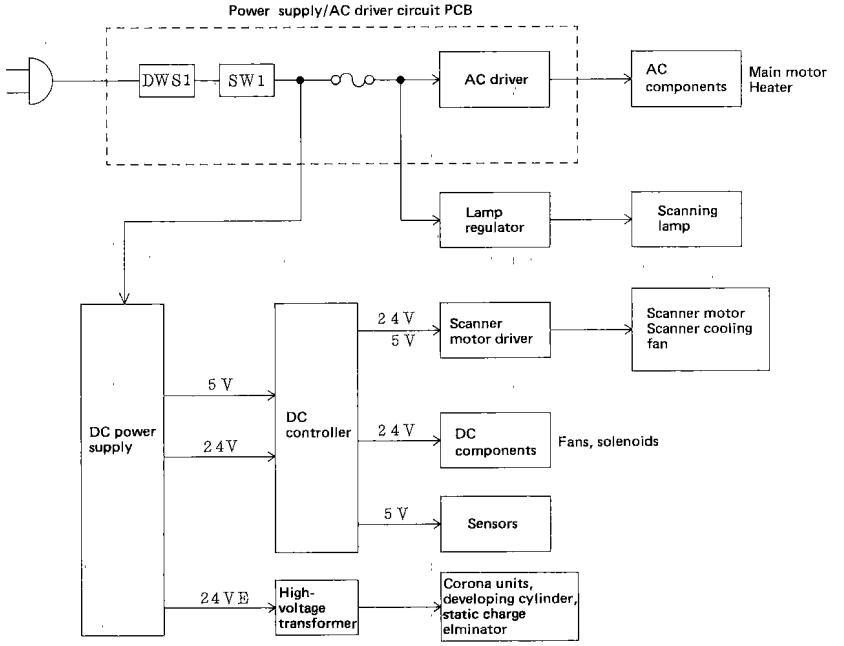

Figure 3-45

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VI. VARIABLE RESISTOR (VR), LED, AND CHECK PIN BY PCB

Discussion will be limited to the variable resistors (VR), LEDs, and check pins that can be used in the field from among those the copier is equipped with.

Those not discussed are for adjustment at the factory only and adjustments and checks using them call for special tools and instruments as well as high accuracy. Do not touch them in the field.

Note:
1. Some LEDs emit light even when OFF because of leakage current.
2. VRs that may be used in the field ..... ●
   VRs that must not be used in the field . ⊘

1) DC Controller

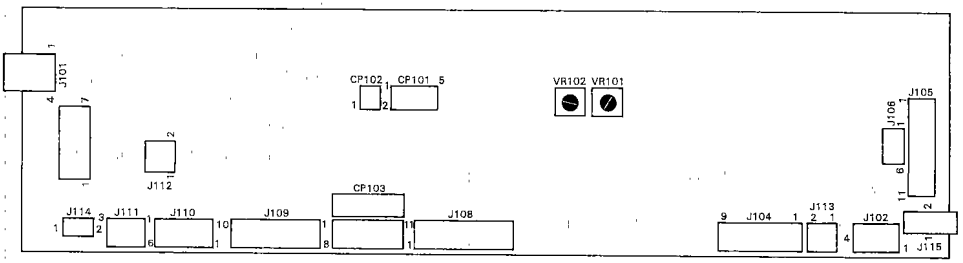

Figure 3-46

VR101: Adjusts AE sensor gain (See p. 2-7.)
VR102: Adjusts margin at leading edge (See p. 2-1.)
CP102: Clears E000, E001

VII. SELF-DIAGNOSIS

The copier is equipped with a mechanism in which the microprocessor on the DC controller checks the condition of the copier (by sensors). Faults detected by such checks are indicated on the copy counter on the control panel in the form of error codes; see the table below (if E000, indicates E0 and 00 alternately).

Code	Cause	Timing
E000	· Thermistor (TH1) has poor contact or broken line. · Heater (H1) has broken line. · Thermoswitch malfunctions. · Delivery unit paper detection PCB is faulty. · DC controller is faulty. · Power supply/AC driver is faulty.	· The fixing assembly roller temperature is 60°C or less 20 sec after the power is turned ON (thermistor has broken line and heater fails to go ON). · The fixing assembly roller drops to 140°C or less after it has reached 155°C (after warm-up; thermistor has broken line and heater fails to go ON). · The heater remains ON ($\overline{HTRD}$ = 0) for 28 sec or more before the fixing assembly roller temperature reaches 155°C (before warm-up; heater has broken line). · The heater remains ON ($\overline{HTRD}$ = 0) for 18 sec or more after the fixing assembly roller temperature reaches 160°C (after warm-up; heater has broken line).
E001	· Thermistor is shorted. · Delivery unit paper detection PCB is faulty. · DC controller is faulty. · Power supply/AC driver is faulty.	· The fixing assembly roller temperature has exceeded 230°C.
E010	· Main motor is faulty. · DC controller is faulty. · Power supply/AC driver is faulty. · Main motor clock sensor (PS3) is faulty.	· The number of drum clock pulses is below the specified value for about 2 sec after the COPY START key is turned ON.
E210	· Scanner motor is faulty (zoom lens drive). · Scanner motor driver is faulty. · Lens solenoid is faulty. · Lens home position sensor is faulty. · DC controller is faulty. · Lens drive cable is slack or off pulley.	· Lens home position (LHP = 1) is not set after output of lens home position set command. · Lens home position is set (LHP = 1) after output of lens home position off command.

NOTE:
Error codes can be cleared by turning the power OFF. This, however, will not work for E000 or E001; otherwise, the broken thermistor will heat and damage the fixing assembly roller. To clear E000 or E001, short CP102-1 and -2 on the DC controller or leave the copier OFF for 20 minutes or longer.

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In addition for the errors in the above table, the microprocessor on the DC controller runs self diagnosis under the following conditions and turns the MAIN/WAIT fixed reproduction indicators OFF and disables key operations.

Indicators	Condition (cause)	Timing
MAIN/WAIT and fixed reproduction indicators disabled	· Scanner drive cable is slack or off pulley. · Scanner motor is faulty. · Scanner motor driver is faulty. · Scanner home position sensor is faulty. · DC controller is faulty.	· The scanner home position sensor detects the light blocking plate about 1.5 sec after the power is turned ON. · The scanner home position sensor does not detect the light blocking plate within about 3 sec after LENS DIRECT is set at time the power is turned ON. · The scanner home position sensor detects the light blocking plate about 0.5 sec after the scanner forward signal is generated during copy operation. · The scanner home position sensor detects the light blocking plate while the scanner in reverse signal is generated during copy operation. · The scanner home position sensor does not detect the light blocking plate about 3 sec after the scanner in reverse signal is generated during copy operation.

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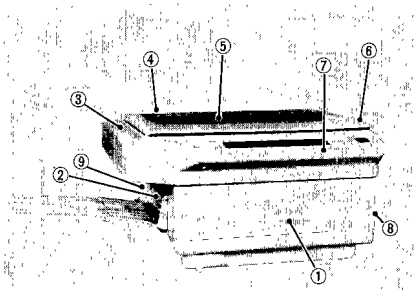
I. EXTERNALS

A. External Covers



① Lower front cover
② Delivery unit cover
③ Upper left cover
④ Upper rear cover
⑤ Copyboard cover
⑥ Upper right cover
⑦ Upper front cover
⑧ Lower right cover
⑨ Lower rear cover

Figure 4-1

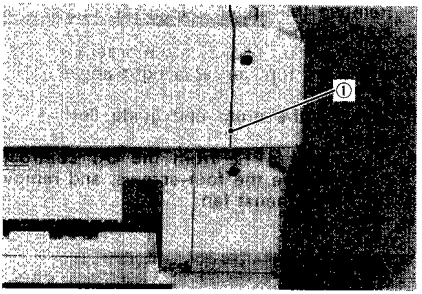
Remove the covers as necessary as shown below for cleaning, inspecting, or repairing the inside of the copier.

Covers that can be detached by mere removal of the screws are left out of the procedure.

1. Removing the Copyboard Glass

1) Remove the copyboard cover.
2) Remove the external covers; upper rear cover, upper front cover, upper left cover, and upper right cover in the order named.

Note:
The covers are shaped with a hook; push on the boss (Figure 4-2) to remove the external covers.



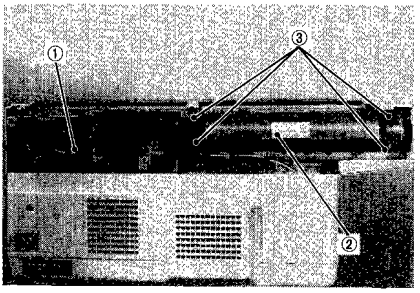
① Boss

Figure 4-2

B. Fans

1. Removing the Scanner Cooling Fan (FM2)

1) Remove the copyboard cover and upper rear cover.
2) Disconnect J403 from the motor driver.
3) Remove the four screws, and remove the scanner cooling fan (FM2).



① J403
② Scanner cooling fan
③ Screws

Figure 4-3

2. Removing the Heat Exhaust Fan (FM1)

1) Remove the drum unit and developing assembly.

- Do not expose the drum unit to sunlight.
- Do not leave finger prints or scratches on the drum.

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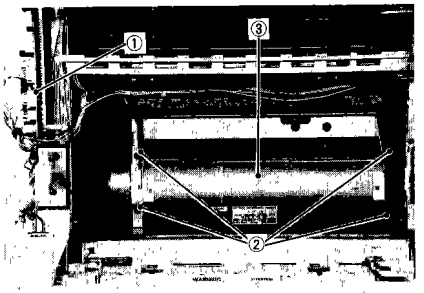
2) Remove the upper rear cover, upper front cover, upper left cover, lower front cover, and lower rear cover in the order named.
3) Open the top unit at a right angle (Figure 4-13).
4) Remove the drum unit guide (left; Figure 4-29).
5) Disconnect J112 from the DC controller PCB, remove the four screws, and remove the heat exhaust fan.



① J112
② Screws
③ Heat exhaust fan

Figure 4-4

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II. DRIVE SYSTEM

A. Lens Drive Unit

The unit is adjusted at the factory using special tools and with high precision. Do not remove parts or loosen screws other than those shown.

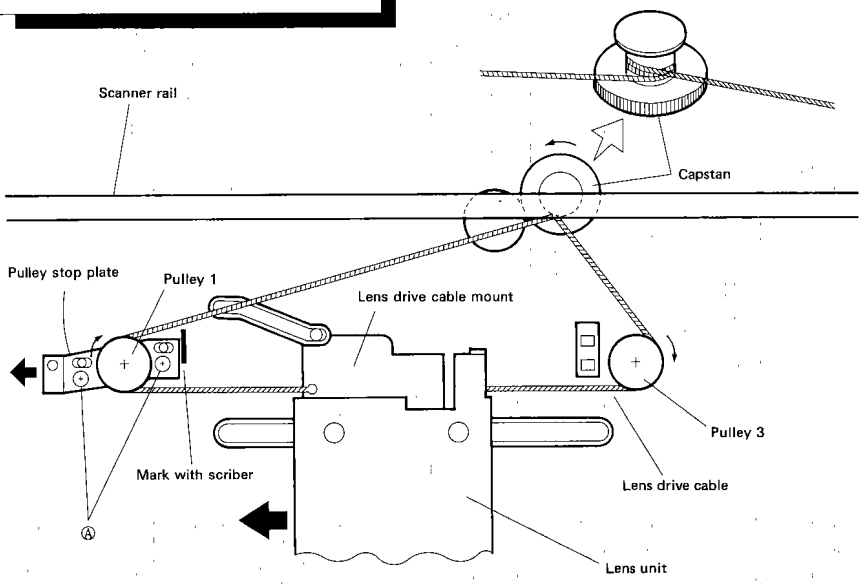

Figure 4-5

1. Detaching the Lens Drive Cable

1) Remove the copyboard glass.
2) Remove the lens cover.
3) Mark the right side of the pulley stop plate with a scriber.
4) Loosen the two screws at A, and detach the lens drive cable.

2. Fitting the Lens Drive Cable

1) Move the lens to the left, and hook the terminal of the lens drive cable on the lens drive cable mount.
2) Hook the cable on pulley 1.
3) Hook the cable on pulley 2 from below, and wind it three times; form three rings first, and hook them.
4) Hook the cable on pulley 3.
5) Hook the terminal of the lens drive cable on the lens drive cable mount. Pull the pulley stop mount to the left to keep the cable tight.
6) Pull the pulley stop mount to the left until it is aligned with the line marked with a scriber, and tighten the two screws at A.

Note:
To remove the lens home position sensor, pull it out while pushing against the hooks with the tip of a pen.

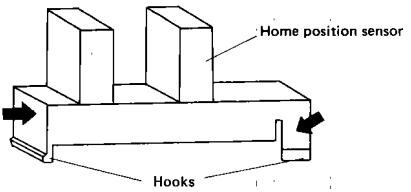

Figure 4-6

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B. Scanner Drive Unit

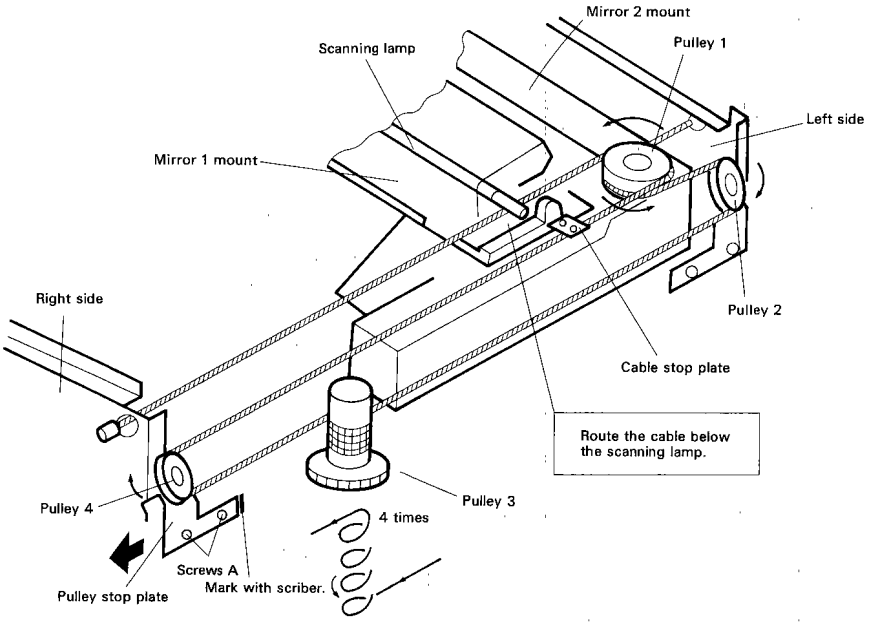
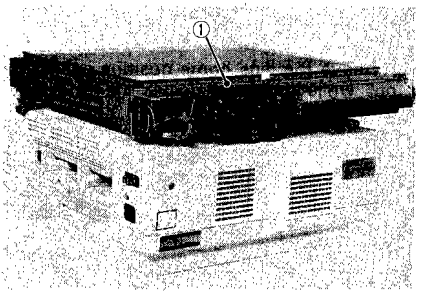


Figure 4-7

1. Detaching the Scanner Drive Cable

1) Remove the copyboard glass.
2) Disconnect J401 and J402 from the motor driver, remove the three screws, and remove the motor driver.
3) Remove the seven screws, and remove the lamp regulator and upper frame stay, to which the scanner fan motor is mounted.



① Upper frame stay

Figure 4-8

4) Mark a line on the right side of the pulley stop plate with a scriber.
5) Loosen screws A (2 pcs.) to loosen the scanner drive cable.
6) Remove the two hex screws, and remove the cable stop plate, and detach the scanner drive cable.

2. Fitting the Scanner Drive Cable

1) Hook the terminal of the scanner drive cable on the hook on the left side.
2) Fit the cable along the groove under pulley 1 counterclockwise.
3) Hook the cable on pulley 8.
4) Wind the cable on pulley 3 from below four times counterclockwise.
5) Fit the cable on pulley 4.
6) Fit the cable along the groove above pulley 1 counterclockwise.
7) Lead the cable between mirror 1 mount and scanning lamp, and fit the cable on the hook on the right side. Pull the pulley stop plate to the left to keep the cable tight.
8) Pull the pulley stop plate until it is aligned with the line marked with a scriber, tighten screw A temporarily, and adjust the wire tension. For details, see p. 4-5.
9) Fit the cable on the mirror mount with the cable stop plate, and adjust the optical distance of mirrors 1 and 2 (p. 4-5).

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3. Adjusting the Scanner Drive Cable

1) Mount the upper frame stay on the upper frame.
2) Hook a spring gauge (CK-0054) on the pulley stop plate as shown in Figure 4-9, pull it horizontally with a force of 3 kg, and tighten screw A in Figure 4-7.

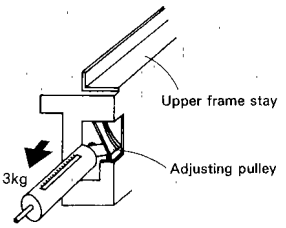

Figure 4-9

4. Adjusting the Mirror Position (optical distance between mirrors 1 and 2)

Adjust the position of the mirrors when the scanner drive cable has been replaced.

The adjustment is made by changing the position of the cable stop plate for the mirror 1 mount (loosen the hex stop screw).

Note:

1. The cable tends to stretch as copies are made; adjust the optical distance in such cases.
2. If the optical distance between mirrors 1 and 2 is not correct, the cross-way reproduction ratio will be wrong and sharpness will fail.

1) Draw a line 1 cm from both sides on copy paper (A4 or A3; Figure 4-10).

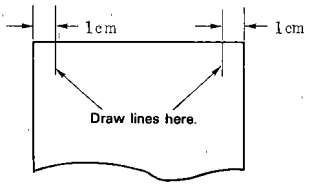

Figure 4-10

2) Use the copy paper with lines as a document, and make a copy. (A)
3) Place a blank sheet of paper on the copyboard, and feed the copy paper with lines; in the manual feed mode. (B)

■ The copy paper fed will show contraction by heat.

4) Align the left lines of the paper copied (A) and paper fed (B), and adjust the position of the mirror 1 mount so that lengths x and y in Figure 4-11 are identical.

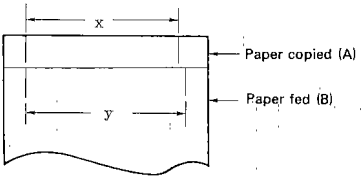

Figure 4-11

If x = y, correct.
If x > y, move the mirror 1 mount into direction a.
If x < y, move the mirror 1 mount into direction b.

Note:

The copy image will be enlarged if the distance between mirrors 1 and 2 is short, and reduced if long.

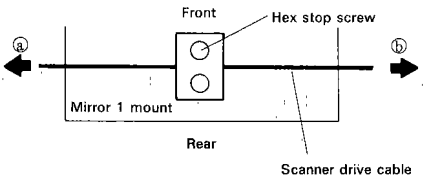

Figure 4-12

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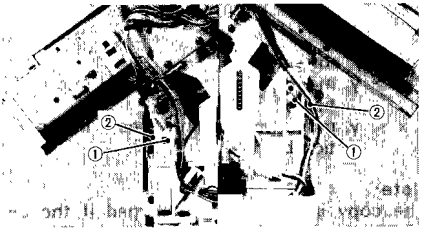
C. Main Motor Unit

1. Removing the Main Motor

- Do not expose the drum cartridge to sunlight.
- Do not leave finger prints or scratches on the drum.

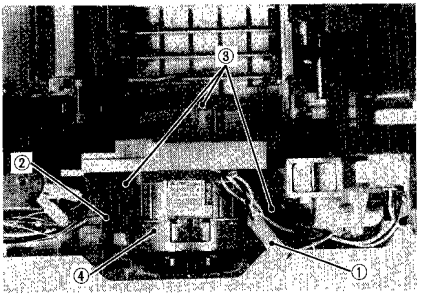
1) Remove the drum cartridge and developing assembly.
2) Remove the upper rear cover, upper front cover, upper left cover, lower front cover, and lower rear cover in the order named.
3) Remove the screw from the hinge (front, rear), and insert a hinge stopper into each.



① Screw ② Hinge stopper

Figure 4-13

4) Open the top unit at a right angle, and disconnect J31 (2P) connected to the power supply/AC PCB and J35 connected to the main motor clock sensor.
5) Remove the three screws, and pull out the main motor gently.



① J31 (2P) ③ Screws
② J35 ④ Main motor

Figure 4-14

III. FEEDER SYSTEM

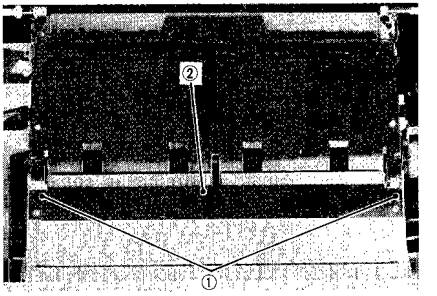
A. Pick-Up Roller Unit

1. Removing the Manual Feed Pick-up Roller

1) Remove the upper rear cover, upper front cover, upper left cover, lower front cover, and lower rear cover in the order named.
2) Open the top unit at a right angle, and remove the electrical unit (DC power supply, power supply/AC driver, and high-voltage transformer); see Figures 4-54 and 4-55.

Note:
Hold the top unit when removing the power unit.

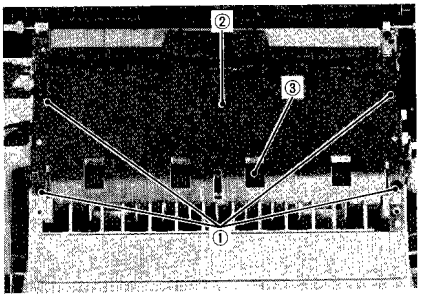
3) Remove the two screws, and remove the manual feed lower guide.



① Screws ② Manual feed lower guide

Figure 4-15

4) Remove the four screws, and remove the pick-up lower guide and manual feed pick-up roller.



① Screws ③ Manual feed pick-up roller
② Pick-up lower guide

Figure 4-16

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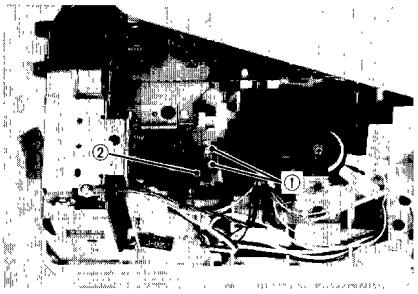
2. Removing the Pick-Up Roller and Cassette Holder

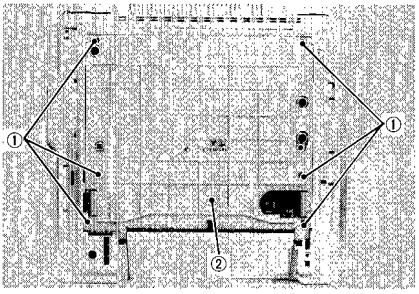
1) Remove the lower front cover, lower rear cover, and lower right cover.
2) Open the top unit, remove the two screws, and remove the power supply/AC driver cover; see Figure 4-57.
3) Remove the two fastons from the pick-up clutch solenoid (PUSL).
4) Remove the screw with a washer.



① Fastons ② Screw (w/ washer)

Figure 4-17

5) Close the top unit, and stand the copier on its right side.
6) Remove the six screws, and remove the pick-up roller and cassette holder.



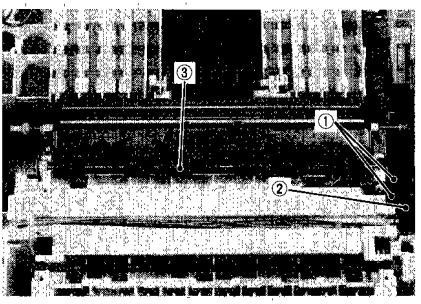
① Screws ② Cassette holder

Figure 4-18

B. Registration Roller

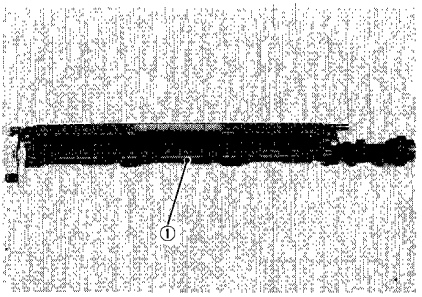
1. Removing the Registration Roller

1) Remove the manual feed lower guide and pick-up lower guide; see Figures 4-15 and -16.
2) Remove the two mounting screws, and remove the registration solenoid cover and registration roller.



① Screws
② Registration solenoid cover
③ Registration roller

Figure 4-19



① Registration roller

Figure 4-20

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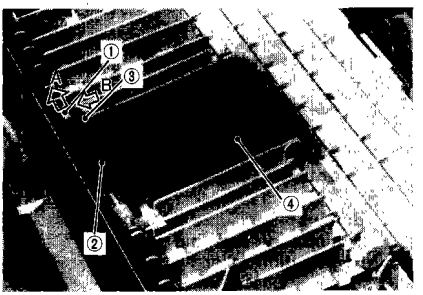
C. Feeder Unit

1. Detaching the Feeder Belt

1) Remove the main motor; see Figures 4-13 and -14 and "Removing the Main Motor."
2) Remove the fixing assembly; see Figure 4-40 and "Removing the Fixing Assembly."
3) Move the separation roller support plate shown in Figure 4-21 in the direction of arrow A, and remove the separation roller.
4) Move the feeder belt pulley shown in Figure 4-21 in the direction of arrow B, pull out the pulley, and detach the feeder belt.



① Separation roller support plate
② Separation roller
③ Feeder belt pulley
④ Feeder belt

Figure 4-21

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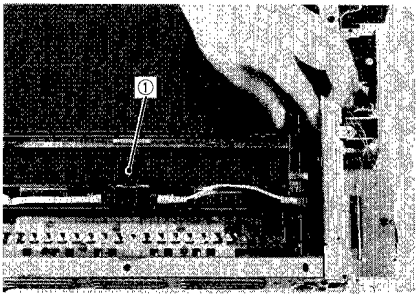
IV. EXPOSURE SYSTEM

A. Lamp Unit

1. Removing the Scanning Lamp

1) Disconnect the power plug.
2) Remove the upper rear cover, upper front cover, upper left cover, and upper right cover in the order named, and remove the copyboard glass.
3) Hold the rear of the mirror 1 mount, and move it to the right until it comes to the cut shown in Figure 4-24.

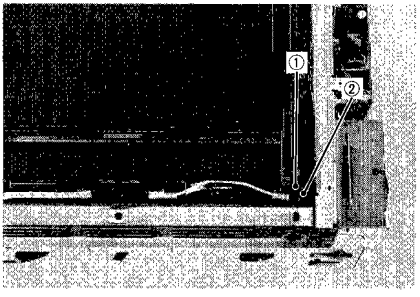
Note:
Be sure to hold the mirror 1 mount as shown in Figure 4-22; the reflector deforms easily.



① Mirror 1 mount

Figure 4-22

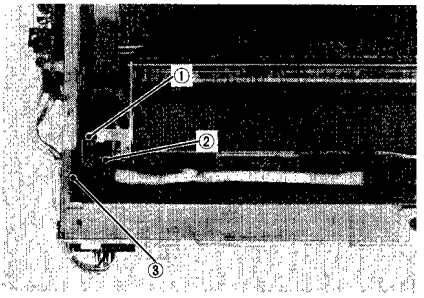
4) Remove the screw from the electrode mount (rear).



① Screw ② Electrode mount (rear)

Figure 4-23

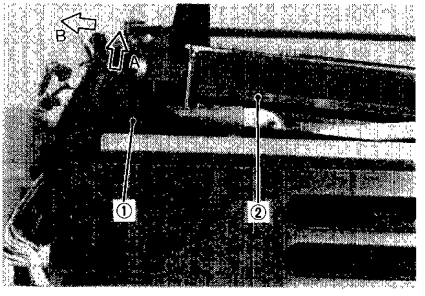
5) Remove the screw from the electrode mount (front).



① Electrode mount (front) ③ Cut
② Screws

Figure 4-24

6) Lift the front of the mirror 1 mount, remove the electrode mount (front) at A and then B, and pull out the scanning lamp slowly.



① Electrode mount (front)
② Scanning lamp

Figure 4-25

Note:
When mounting the scanning lamp, hold it so that its boss faces down at an angle.

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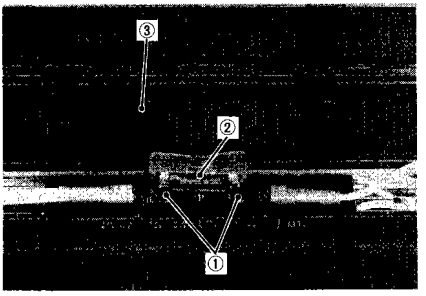
2. Mounting the Thermal Fuse

1) Fix the thermal fuse with two screws (w/ washer) while keeping the terminals of the fuse free of stress.

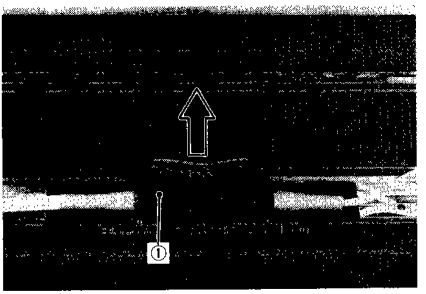
Note:
Check that the thermal fuse is uniformly in contact with the reflector.



① Screws (w/ washer)
② Thermal fuse
③ Reflector

Figure 4-26

2) Push the fuse cover lightly in the direction of the arrow, and fix it with a screw.



① Fuse cover

Figure 4-27

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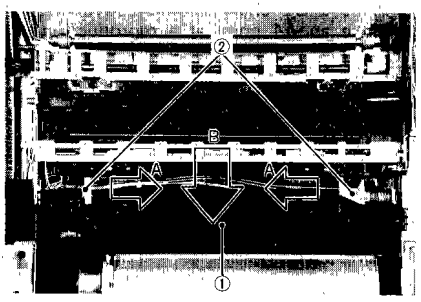
B. Blank Exposure Unit

1. Removing the Blank Exposure PCB (front, rear)

1) Remove the drum unit and developing assembly.

- Do not expose the drum unit to sunlight.
- Do not leave finger prints or scratches on the drum.

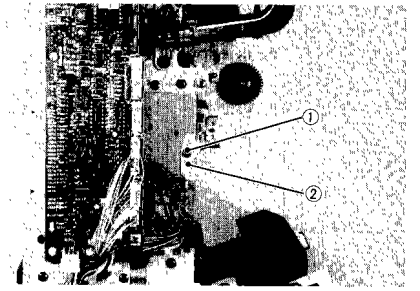
2) Remove the upper rear cover, upper front cover, upper left cover, lower front cover, and lower rear cover in the order named.
3) Open the top unit at a right angle; see Figure 4-13.
4) Slide off the two locks of the drum unit guide (left) to the direction of arrow A and then to the direction of arrow B.



① Drum unit guide (left) ② Lock

Figure 4-28

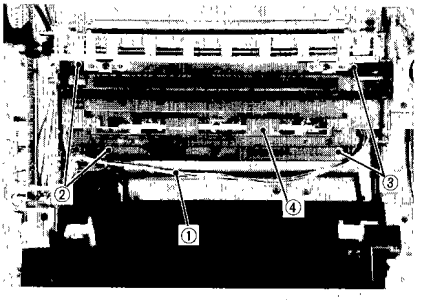
5) Remove the screw, and remove the drum unit guide (left).



① Screw ② Drum unit guide (left)

Figure 4-29

6) Remove the harness as shown in Figure 4-30, and disconnect J102 and J113 from the DC controller.
7) Remove the four screws, and remove the blank exposure unit; release the unit to facilitate removal of the screws.



① Harness ③ Screws
② Screw (stepped) ④ Blank exposure unit

Figure 4-30

Note:
When mounting the harness, be sure that the blank exposure unit has been mounted first.

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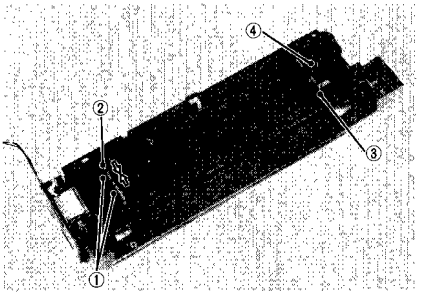
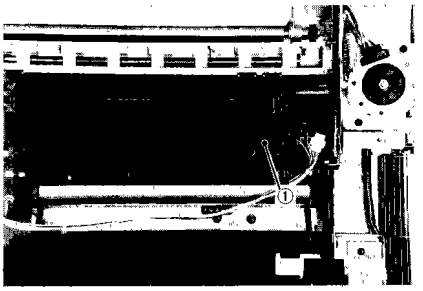
8) Push the PCB stopper shown in Figure 4-31 in the direction of the arrow, and remove the blank exposure PCB (front, rear).



① PCB stopper
② Blank exposure PCB (front)
③ Blank exposure PCB (rear)
④ Blank exposure PCB drive boss

Figure 4-31

Note:
When mounting the blank exposure unit, move the blank exposure PCB drive boss shown in Figure 4-31 to the inside of the copier, and fit it on the boss guide shown in Figure 4-32.

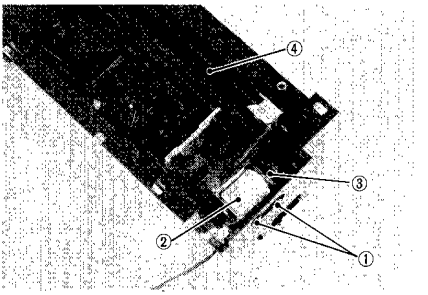


① Boss guide

Figure 4-32

2. Adjusting the Blank Shutter Solenoid

1) Loosen the two screws holding the solenoid shown in Figure 4-33, move the blank shutter solenoid, and fix the solenoid where the plunger and blank shutter can move smoothly.



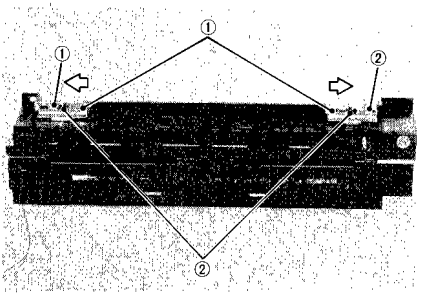
① Solenoid fixing screws
② Blank shutter solenoid
③ Plunger
④ Blank shutter

Figure 4-33

3. Adjusting the Reflector (front, rear)

The non-image width in the reduction mode at front and rear is adjusted by moving the reflector at the front and rear of the blank exposure unit.

1) Place a B4 chart on the copyboard, and make an A4 copy at a reproduction ratio of 81%.
2) If the copy has a non-image area, move the reflector to the outside 2/5 the non-image area shown on the copy.



① Blank exposure reflector (front, rear)
② Blank exposure reflector fixing screws

Figure 4-34

3) Place a B4 chart on the copyboard, make an A4 copy at a reproduction ratio of 70%, and check that the area outside the image is free of black lines.

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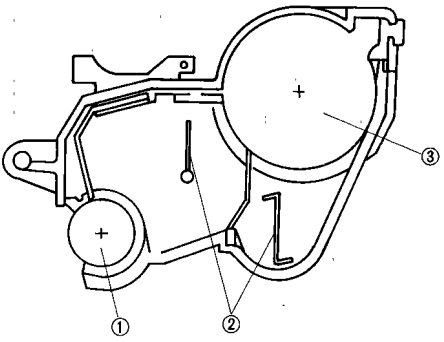
V. DEVELOPING SYSTEM

A. Developing Assembly

1. Construction

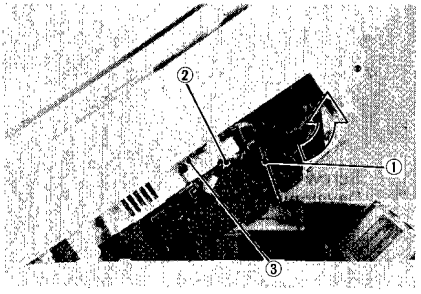


① Developing cylinder
② Stirring blade
③ Toner cartridge

Figure 4-35

2. Removing the Developing Assembly

1) Open the top unit.
2) Push the developing assembly release lever deep inside the copier, and push it up in the direction of the arrow.



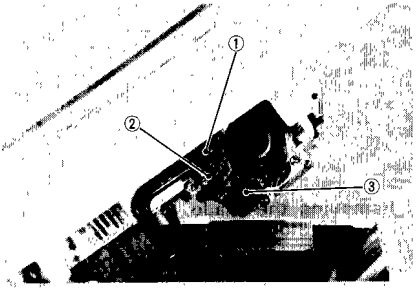
① Developing assembly release lever
② Screw ③ Drum unit

Figure 4-36

3) Turn the screw counterclockwise.
4) Pull out the drum unit slowly.

> · Do not expose the drum unit to sunlight.
> · Do not leave finger prints or scratches on the drum.

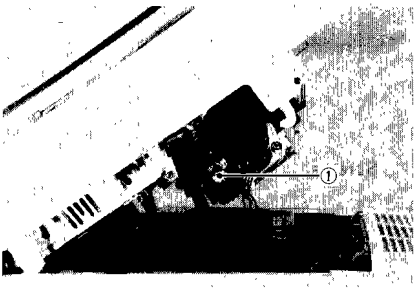
5) Return the developing assembly release lever to the position shown in Figure 4-37.
6) Remove the screw, and remove the developing assembly pressure unit.



① Screw
② Spring
③ Developing assembly pressure unit

Figure 4-37

7) Disconnect the relay connector.



① Relay connector

Figure 4-38

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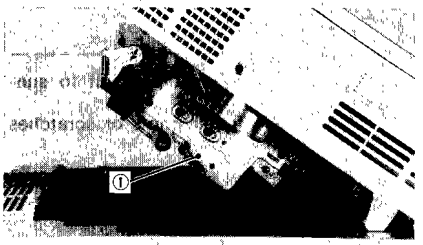
8) Remove the spring from the copier (rear).



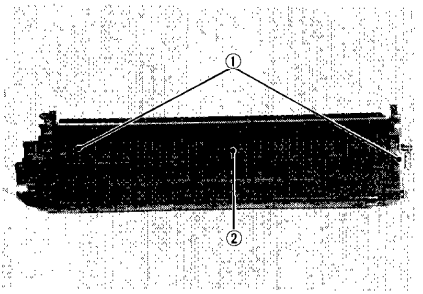
① Spring

Figure 4-39

9) Push up the developing assembly release lever in the direction of the arrow in Figure 4-36, and pull out the developing assembly.

3. Removing the Blade, Developing Cylinder, and Side Seal

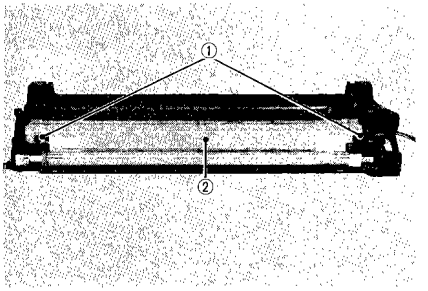
1) Remove the developing assembly from the copier.
2) Remove the two screws, and remove the upper cover.



① Screws ② Upper cover

Figure 4-40

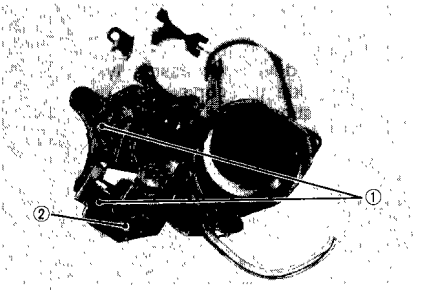
3) Remove the two screws, and remove the blade.



① Screws ② Blade

Figure 4-41

4) Remove the two screws from the developing cylinder holder.



① Screw
② Developing cylinder holder

Figure 4-42

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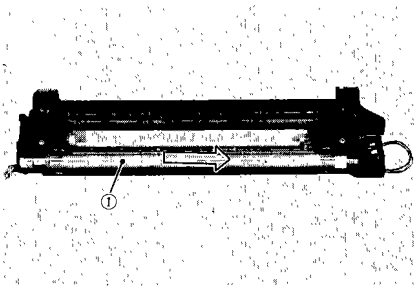
5) Hold the developing cylinder support, and pull out the developing cylinder in the direction of the arrow slowly.



① Developing cylinder

Figure 4-43

6) Remove the side seal.

4. Mounting the Side Seal and Blade

1) Clean the section on which the side seal is attached with alcohol.
2) Attach the side seal as shown in Figures 4-44, -45, -46, and -47.

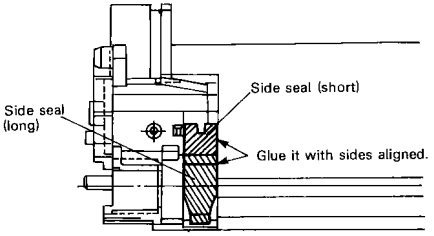


Figure 4-44 Front View (rear)

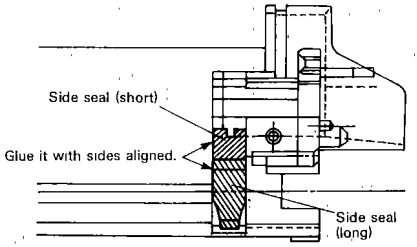


Figure 4-45 Front View (front)

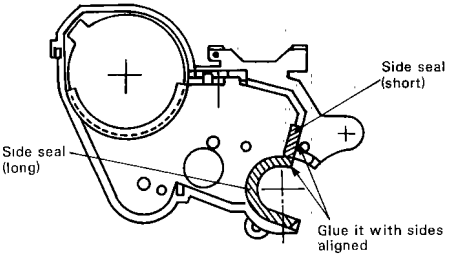


Figure 4-46 Cross Section (rear)

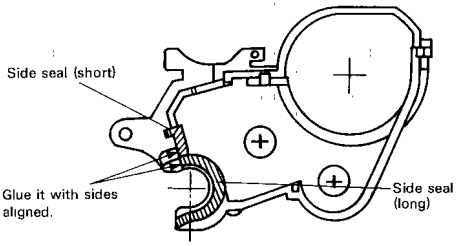


Figure 4-47 Cross Section (front)

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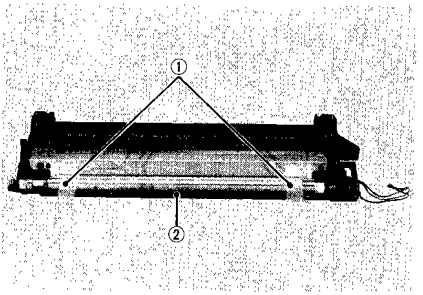
3) Mount the developing cylinder and developing cylinder holder.
4) Insert a gap gauge (TKN-0172) as shown in Figure 4-48 between both ends of the developing cylinder and blade.

- Do not leave finger prints or scratches on the developing cylinder.



① Gap gauge
② Developing cylinder

Figure 4-48

5) Push the blade lightly from above, and fix it with two screws.
6) Pull out the gap gauge.
7) Mount the upper cover.

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VI. CHARGING AND CLEANING UNITS

A. Drum Unit

1. Outline

The drum, primary corona unit, and cleaner of the copier are constructed as a single entity which is referred to as the drum unit.

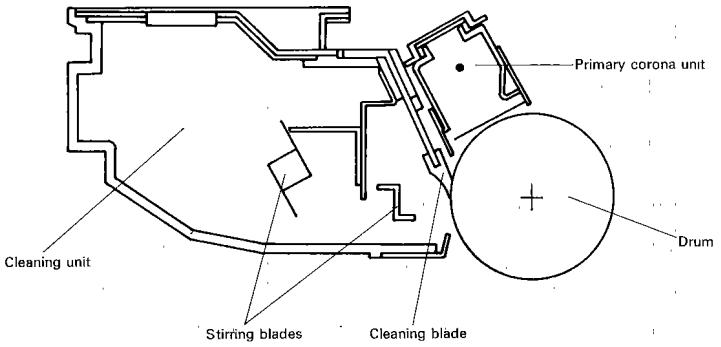


Figure 4-49

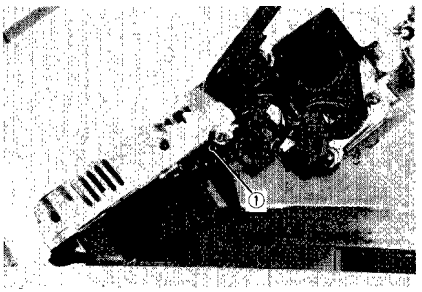
2. Cleaning the Drum

1) Open the top unit, and remove the drum unit; see p. 4-13.
2) Clean the surface of the drum with a soft cloth coated with toner.

Note:
1. Turn the drum in the direction it turns during copy operation; otherwise, the cleaning blade will be deformed.
2. Clean the drum with a soft cloth; do not use paper, lint-free or others, as it will damage the drum.
3. Clean the drum as quickly as possible, and avoid exposure to light as much as possible.*

* If exposed to light with an intensity of 1,500 lux. (general office lighting) for five minutes and left alone in the dark for five minutes thereafter, the drum may recover and may not present any practical problem; nevertheless, avoid exposure to sunlight. The rays of the sun has an intensity of between about 10,000 and 30,000 lux.

Note:
When mounting the drum unit, make sure that the air blocking sheet is positioned as in Figure 4-50.



① Air blocking sheet

Figure 4-50

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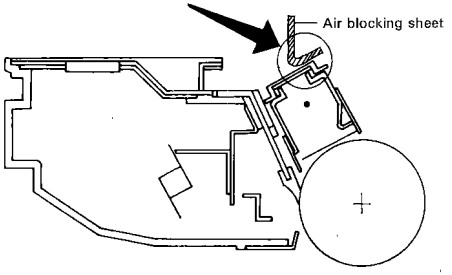


Figure 4-51

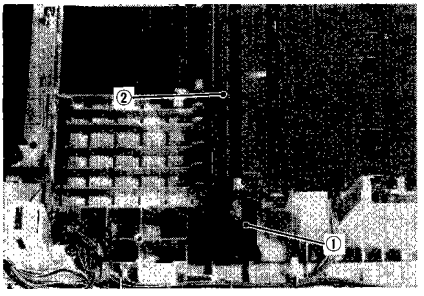
B. Transfer Corona Unit

1. Outline

The corona wire used for the transfer corona unit is 0.08 mm in diameter. The wire at the time the copier is shipped out of the factory is not gold-plated; gold-plated wire, however, may be used in the field.

2. Removing the Transfer Corona Unit

1) Remove the electrical unit; see Figure 4-52.
2) Remove the screw, and pull out the transfer corona unit.



① Screw ② Transfer corona unit

Figure 4-52

3. Fitting the Corona Wire

1) Remove the front and rear covers from the corona unit.
2) Fray a length of about 40mm from the corona wire reel (0.08 mm dia.), and form a ring at its end with a diameter of about 2 mm.

Note:
To form the ring, wind the wire around a hex key once, turn the hex key about three to four times, and twist the wire.

3) Cut the end of the corona wire (excess) to less than 1 mm with a nipper.
4) Hook the ring of the corona wire as shown in Figure 4-53, hook the corona wire tension spring on the corona wire, and twist the spring three to four times as shown in the figure.

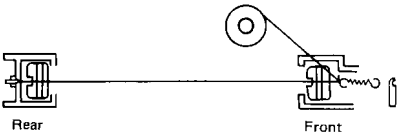


Figure 4-53

5) Cut the excess corona wire to less than 1 mm with a nipper.
6) Pick the end of the corona wire tension spring with tweezers, and hook it on the corona electrode.

Note:
Make sure that the corona wire is free of bends or twists and its gold-plating has not peeled.

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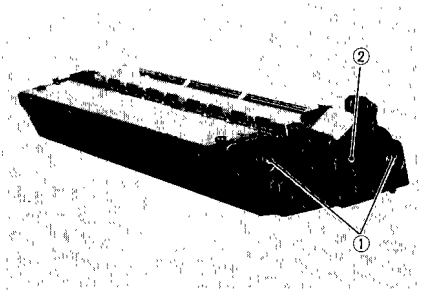
C. Primary Corona Unit

1. Removing the Primary Corona Unit

1) Remove the drum unit from the copier.

- Do not expose the drum unit to sunlight.
- Do not leave finger prints or scratches on the drum.

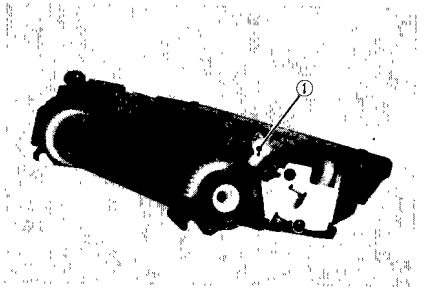
2) Remove the two screws, and remove the drum unit front cover.



① Screws ② Front cover

Figure 4-54

3) Remove the primary corona unit stopper, and replace the primary corona unit.



① Primary corona unit stopper

Figure 4-55

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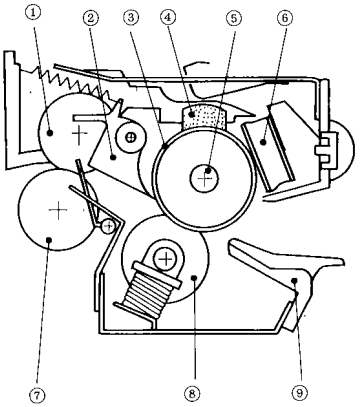
VII. FIXING SYSTEM

A. Fixing Assembly

1. Construction



① Delivery roller (upper)
② Separation claw
③ Upper roller
④ Fixing assembly cleaning unit
⑤ Fixing heater (850 W)
⑥ Thermoswitch
⑦ Delivery roller (lower)
⑧ Lower roller
⑨ Paper guide

Figure 4-56

2. Pressure Unit

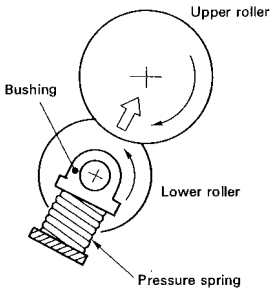
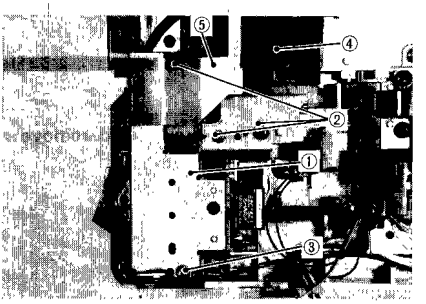


Figure 4-57

The lower roller is subjected to pressure to the direction of the arrow by the pressure spring built into the bushing of the lower roller. The copier is not equipped with an adjusting mechanism for the roller pressure.

3. Removing the Fixing Assembly

1) Remove the main motor; see Figures 4-13 and -14.
2) Remove J301 from the delivery unit paper detection PCB and two fastons.
3) Remove the three screws and screw with a washer, and remove the fixing assembly.

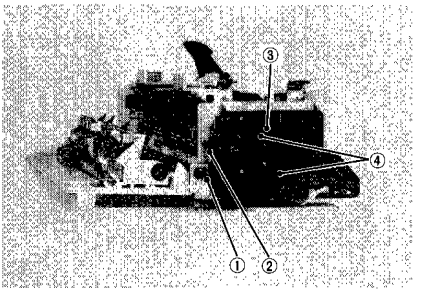


① J301
② Fastons
③ Screws
④ Fixing assembly
⑤ Screw (w/ washer)

Figure 4-58

4. Removing the Heater, Upper Roller, and Lower Roller

1) Remove the fixing assembly from the copier.
2) Open the delivery door, and remove the screw, delivery unit stopper, and leaf spring, and remove the delivery unit.
3) Remove the two screws holding the delivery unit detection PCB.



① Delivery unit stopper
② Leaf spring
③ Delivery unit paper detection PCB
④ Screws

Figure 4-59

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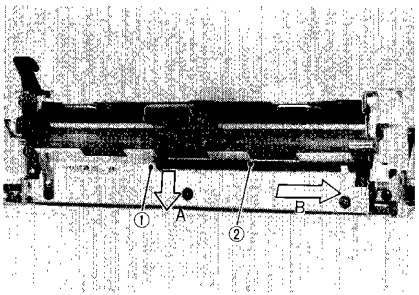
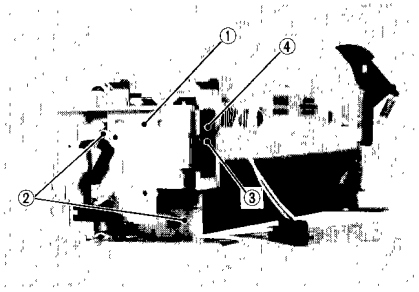
4) Pull out the arm to the front (arrow A), and pull out the paper detection lever in the direction of arrow B.



① Paper detection lever ② Arm

Figure 4-60

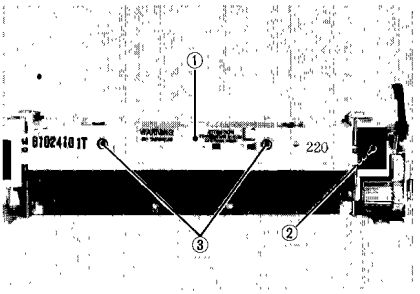
5) Remove the black face seal and three screws, and remove the front heater terminal mount.



① Heater terminal mount
② Screws
③ Screw (w/ washer)
④ Face seal

Figure 4-61

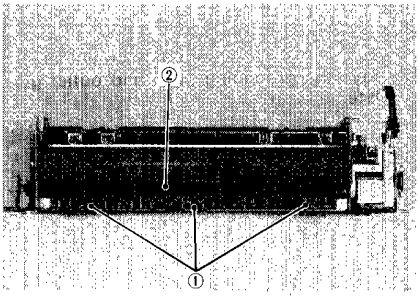
6) Pull out the heater slowly to the front.
7) Peel off the black face seal and remove the three screws, and remove the thermoswitch mount.



① Thermoswitch mount ③ Screws
② Screw (w/ washer)

Figure 4-62

8) Remove the three screws, and remove the paper guide.

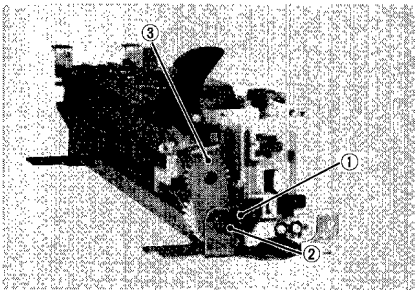


① Screws ② Paper guide

Figure 4-63

9) Remove the spring from the fixing assembly drive gear unit.
10) Remove the E-ring, and remove the fixing assembly drive gear unit.

Note:
Take care; some side plates are fitted with an E-ring on the back.



① Spring ③ Fixing assembly drive gear unit
② E-ring

Figure 4-64

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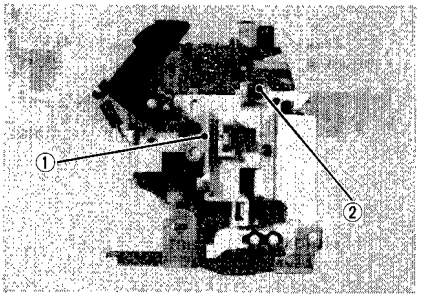
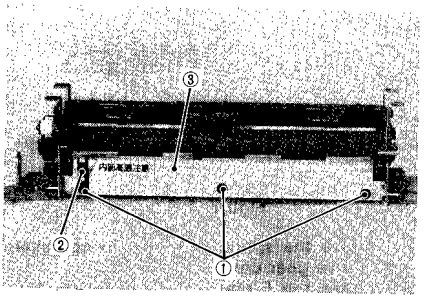
11) Remove the two screws, and remove the rear heater terminal mount.



① Heater terminal mount ② Screw

Figure 4-65

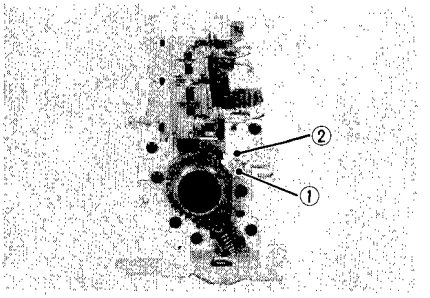
12) Remove the three stepped screws, and remove the grounding plate and outlet guide plate.



① Screws (stepped) ③ Outlet guide plate
② Grounding plate

Figure 4-66

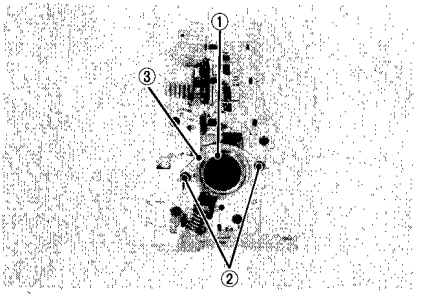
13) Remove the grip stop ring, and remove the delivery roller drive gear.



① Grip stop ring
② Delivery roller drive gear

Figure 4-67

14) Remove the two screws from the upper roller bushing mount (front), and remove the stop ring and then upper roller bushing mount.



① Stop ring ③ Bushing mount
② Screws

Figure 4-68

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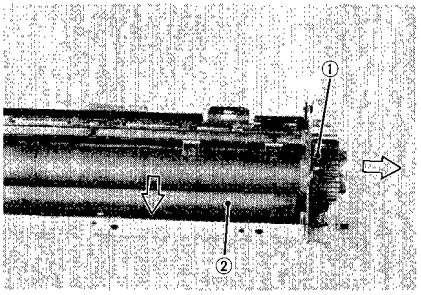
15) Push the upper roller against the lower roller, and pull it out of the bushing (rear) slowly.



① Upper roller ② Lower roller

Figure 4-69

16) Remove the lower roller.

5. Mounting the Lower Roller, Upper Roller, and Heater

Mount the lower roller, upper roller, and heater according to the foregoing procedures but in reverse. Note the following:

- Do not touch the surface of the heater.
- Mount the heater with its ratings print to the rear.
- Wrap the upper roller in copy paper to protect it against dirt or scratches.
- Make sure that the detection face of the thermistor is in uniform contact with the surface of the upper roller.

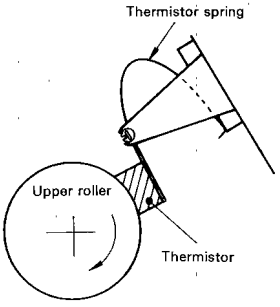


Figure 4-70

If the contact is not uniform, check the thermistor spring for deformation.

- Check that the detection face of the thermoswitch is in uniform contact with the surface of the upper roller.

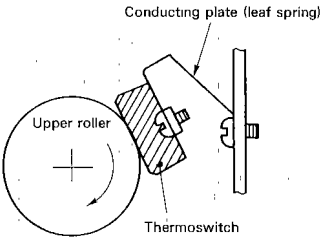


Figure 4-71

If the contact is not uniform, check the conducting plate of the thermoswitch for deformation.

- The copier does not allow adjustment of the nip; the nip width is correct if within the values shown in Table 4-1.

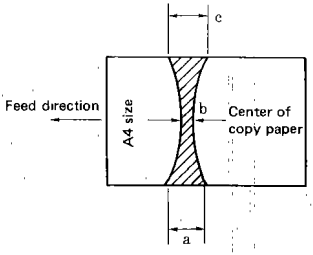


Figure 4-72

Distance	Measured when upper and lower rollers are adequately heated.
b	2.8 ~ 4.0 mm
$\left\lvert \frac{a-b}{c-b} \right\rvert$	0.9 mm or less

Table 4-1

- Measuring the Nip Width

1) Open the copyboard cover, and make a solid black copy in A4.
2) Turn the power OFF as soon as the leading edge of the copy paper is about to come on the copy tray, and open the top unit.
3) Pull out the copy paper from the fixing assembly 20 to 30 sec thereafter.
4) Measure the width of the section over which the toner is shiny.

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VIII. ELECTRICAL

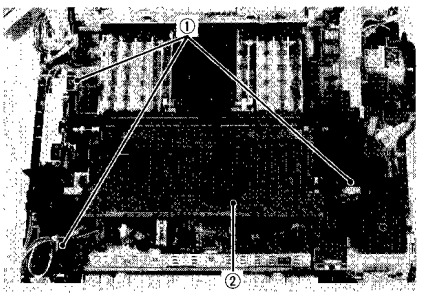
A. Electrical Unit

Note:
The electrical unit of the copier refers to a unit consisting of the power supply/AC driver, DC power supply, and high-voltage transformer; see Figure 4-74.

1. Removing the Electrical Unit

1) Remove the upper rear cover, upper front cover, upper left cover, lower front cover, lower rear cover, and lower right cover in the order named.
2) Open the top unit at a right angle, and disconnect the following connectors:
- J602, J603, and J604 from DC power supply
- J1, J2, and J3 from power supply/AC driver
- J901 from high-voltage transformer

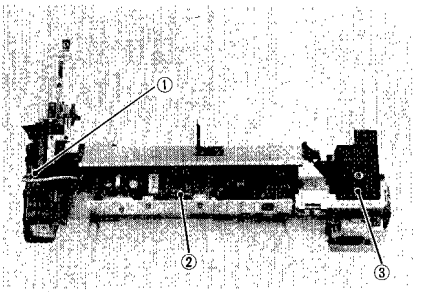
3) Remove the screw with a washer from the power supply/AC driver, and remove the grounding wire.
4) Remove the three screws, and remove the electrical unit.



① Screws ② Electrical unit

Figure 4-73

Note:
Hold the top unit when removing the electrical unit.

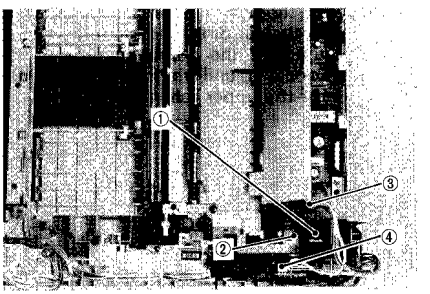


① High-voltage transformer
② DC power supply
③ Power supply/AC driver

Figure 4-74

2. Removing the High-Voltage Transformer

1) Remove the upper rear cover, upper front cover, upper left cover, lower front cover, lower rear cover, and lower right cover in the order named.
2) Open the top unit at a right angle.
3) Remove the two screws, disconnect the following connectors, and remove the high-voltage transformer.
- J603 from DC power supply PCB
- J901 from high-voltage transformer



① Screw ③ J603
② Screw ④ J901

Figure 4-75

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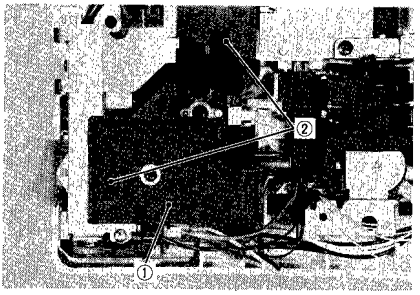
3. Removing the Power Supply/AC Driver

1) Remove the upper rear cover, upper front cover, upper left cover, front lower cover, lower rear cover, and lower right cover in the order named.
2) Open the top unit at a right angle.
3) Remove the two screws, and remove the power supply/AC driver cover.

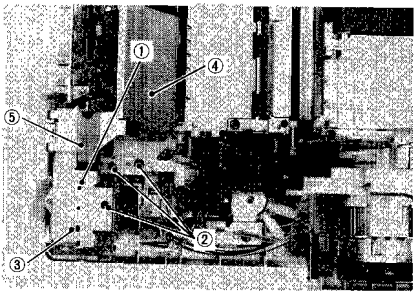


① Power supply/AC driver cover
② Screw

Figure 4-76

4) Disconnect J601 from the DC power supply PCB and J1, J2, and J3 from the power supply/AC driver.
5) Remove the three screws and screw with a washer holding the grounding wire, and remove the power supply/AC driver.

Note:
When mounting the power supply/AC driver, make sure that the door switch plate is under the heat radiating plate. (Check that the door switch is pressed without fail by opening and closing the top unit.)

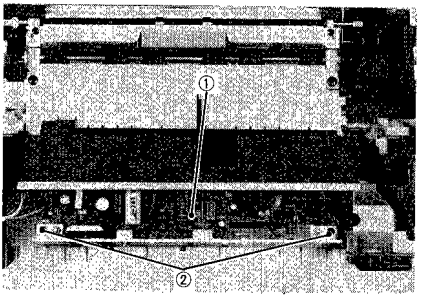


① Power supply/AC driver
② Screws
③ Screw (w/ washer) for grounding wire
④ Door switch plate

Figure 4-77

4. Removing the DC Power Supply PCB

1) Remove the upper rear cover, upper front cover, upper left cover, lower front cover, lower rear cover, and lower right cover in the order named.
2) Open the top unit at a right angle.
3) Remove J601, J602, J603, and J604 from the DC power supply PCB and two screws, and remove the DC power supply PCB.



① DC power supply PCB ② Screws

Figure 4-78

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I. LOCATION

The location of the copier should be chosen based on the following considerations. If possible, make a visit to the customer for a study of the site before delivery of the copier.

- The power supply should be connected to an outlet capable of supplying the voltage (±10%) and power shown on the rating plate. A grounding (3-pin) plug must be used. (The copier must be effectively grounded).
- The ambient temperature should be between 5°C and 32.5°C and the humidity, 5% to 90%. Avoid locations near water faucets, humidifiers, water boilers, and refrigerators.
- Avoid locations near open flame or subject to dust or ammonia fumes and direct rays of the sun. Provide curtains over the windows if necessary.
- Choose a well-ventilated location.
- Make sure all feet of the copier will be in contact with the floor.
- Allow at least 10 cm from any wall to provide access.

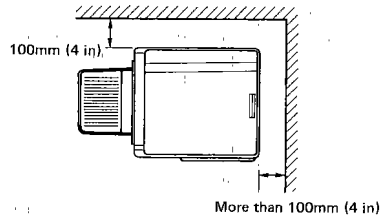

Figure 5-1

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II. UNPACKING AND INSTALLATION

When a piece of metal is moved from a cold place to a warm place, droplets of water form on its surface. This phenomenon is known as condensation. Condensation affects the performance of machines. The simplest way to eliminate condensation from the copier, any machines for that matter, is to leave it alone until it warms to room temperature (at least one hour).

Step	Procedure	Checks	Remarks
1	Unpack the carton.		
2	Take out the contents of the carton.	Check that the following are available: · Copy tray · Cassette · Power cord · Drum unit · Operator's Manual · Cotton-tipped stick · Installation Procedure · Warranty card for Copier · Warranty card for Drum	
3	Remove the aluminum bag from the copier, and remove the tape holding the parts together.	Check that the covers are free of damage or deformation from transit.	
4	Remove the screw holding the scanner in place. (See Figure 5-2.)		Keep the screw for possible relocation.
5	Open the delivery cover, and remove the spacers (2 pcs.) holding the fixing roller in place. (See Figure 5-2.)		
6	Pull up the open/close lever, and open the copier.		
7	Take out a toner cartridge from the bag, and shake it several times while holding it level. Set the toner cartridge in the copier.		
8	Bend and break the open tab of the toner cartridge, and force the cartridge to the front peeling the seal. Turn the cartridge clockwise until it stops (180 deg.).		
9	Close the copier.		
10	Set the copy tray and cassette on the carrier.		

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Step	Procedure	Checks	Remarks
11	Connect the power plug to the copier and the outlet, and shift the power switch to 'I'.	· Check that the MAIN/WAIT indicator flashes. · Check the movement of the COPY DENSITY lever. · Press the +, −, CLEAR/COPY STOP keys to check that the copy count is correct. · Press the AE key, to check that the AE indicator goes OFF, or ON. · Press the REDUCTION/ ENLARGEMENT key to check that the reproduction mode changes. · Press the ZOOM key to check that the ZOOM indicator goes ON; press the + and − keys to check that the zoom ratio displayed is correct.	
12	Open the delivery cover, and hold the ZOOM and CLEAR/ STOP keys down, and close the delivery cover.		The copier supplies toner into the cylinder for about 3 min.
13	Press the COPY START key when the MAIN/WAIT indicator goes ON.	Check that the copy count is 'P' when the COPY START key is pressed without copy paper.	
14	Place copy paper in the cassette, and set the cassette in the copier.		
15	Set the Test Sheet on the copyboard, and check the copying operation.	· Check that the copier is free of abnormal noise. · Check that copies are made in the number specified.	
16	Clean the outside of the copier and its vicinity, and record necessary information on the Service Sheet.		

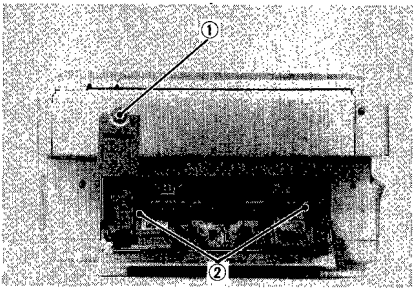

Figure 5-2

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III. RELOCATION

Before relocating the copier by truck or similar means, perform the following:

Step	Procedure	Checks	Remarks
1	Turn the power OFF, and disconnect the power plug from the outlet.		
2	Remove the copy tray.		
3	Remove the cassette.		
4	Remove the drum unit.		Keep the drum unit in a box; take care so that vibration will not affect it in transit.
5	Fit the scanner fixing screw. (See Figure 5-2.)	Check that the scanner is fixed in position on the carrier.	
6	Tape the upper unit of the copier.		
7	Place a sheet of B4 copy paper on the copyboard glass, and tape the copyboard.		

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I. PARTS TO BE REPLACED PERIODICALLY

The table below is a list of parts to be replaced periodically in maintaining the performance of the copier. Replace them as scheduled even when they seem to be free of damage or deformation. Should they fail, the effect will be considerable.

Arrange the schedule so that the replacement may be made during the service call closest to the end of their life.

End of Dec., 1988

No.	Parts name	Parts No.	Qt'y	Life (copies)	Remarks
1	Ozone filter	FB1-4061-000	1	50,000	
2	Fixing assembly*	FG5-0628-000	1	50,000	115V
	Fixing assembly*	FG5-0629-000	1	50,000	220V
	Fixing assembly*	FG5-0630-000	1	50,000	240V
3	Transfer corona unit	FG5-0608-000	1	50,000	

* Replace the upper roller (FB1-4065-000) if the fixing assembly is not immediately available.

Note:

The values are estimates only and subject to change based on future data.

II. LIVES OF CONSUMABLES

The following is a table of consumables which, over the warranty period of the copier, are expected to need replacement once or more because of deterioration or damage. The life of the consumables is expressed in terms of the number of copies processed; replace them when they prove to be faulty.

End of Dec., 1988

No.	Parts name	Parts No.	Qt'y	Life (copies)	Remarks
1	Fixing assembly cleaning unit	FG5-0631-000	1	4,000	A4 copies (comes w/ every 2 toner cartridges)

Note:

The values are estimates only and subject to change based on future data.

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III. PERIODICAL SERVICING PROCEDURE

Note:
1. Perform the following every 10,000 copies, as a rule.
2. Check the Service Record before making a visit; take replacement parts if replacement is expected.

No.	Step	Check item	Remarks
1	Meet the user.	Check the condition.	
2	Record the counter reading.	Check the faulty copies.	
3	Make test copies; DIRECT, REDUCTION, ENLARGEMENT.	a. Image density b. Soiled background c. Clarity of characters d. Leading edge margin e. Fixing, registration, soiled back f. Abnormal noise g. Counter operation	Standard: 2.0 +2.0, −1.5
4	Clean the corona units.		Dry wipe with lint-free paper; thereafter, clean with alcohol.
5	Clean the transfer guide.		Remove the drum unit.
6	Clean the separation and feeder systems. · Feeder belt · Static charge eliminator		Mount the drum unit.
7	Clean the fixing and delivery systems. · Inlet guide · Separation claw		Clean with cleaning oil.
8	Perform periodical servicing according to the counter reading (p. 6-3).		
9	Clean the copyboard cover and copyboard glass.		Use alcohol.
10	Make test copies.		
11	Make sample copies.		
12	Arrange sample copies in order, and clean up the area.		
13	Record the counter reading.		
14	Fill out the Service Sheet, and report to the user.		

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IV. PERIODICAL SERVICING PARTICULARS

Note: Do not use solvents or oils other than specified.

△: Clean ○: Replace ×: Lubricate □: Adjust ○: Check

System	Parts	Interval				Remarks
		Every 20,000 copies	Every 50,000 copies			
Outside	Copyboard glass		△			Alcohol
Scanner	Scanner rail		×			Oil
Feeder	Feeder unit	△				
	Transfer guide	△				
Optical path	Reflector		△			Alcohol
	Side reflector		△			
	Mirrors 1 through 6		△			
	Lens		△			
	Dust glass	△				
Corona units	Primary	△				
	Transfer	△				
Developing assembly	Roller	△				MEK
Fixing assembly	Separation claw	△				Alcohol

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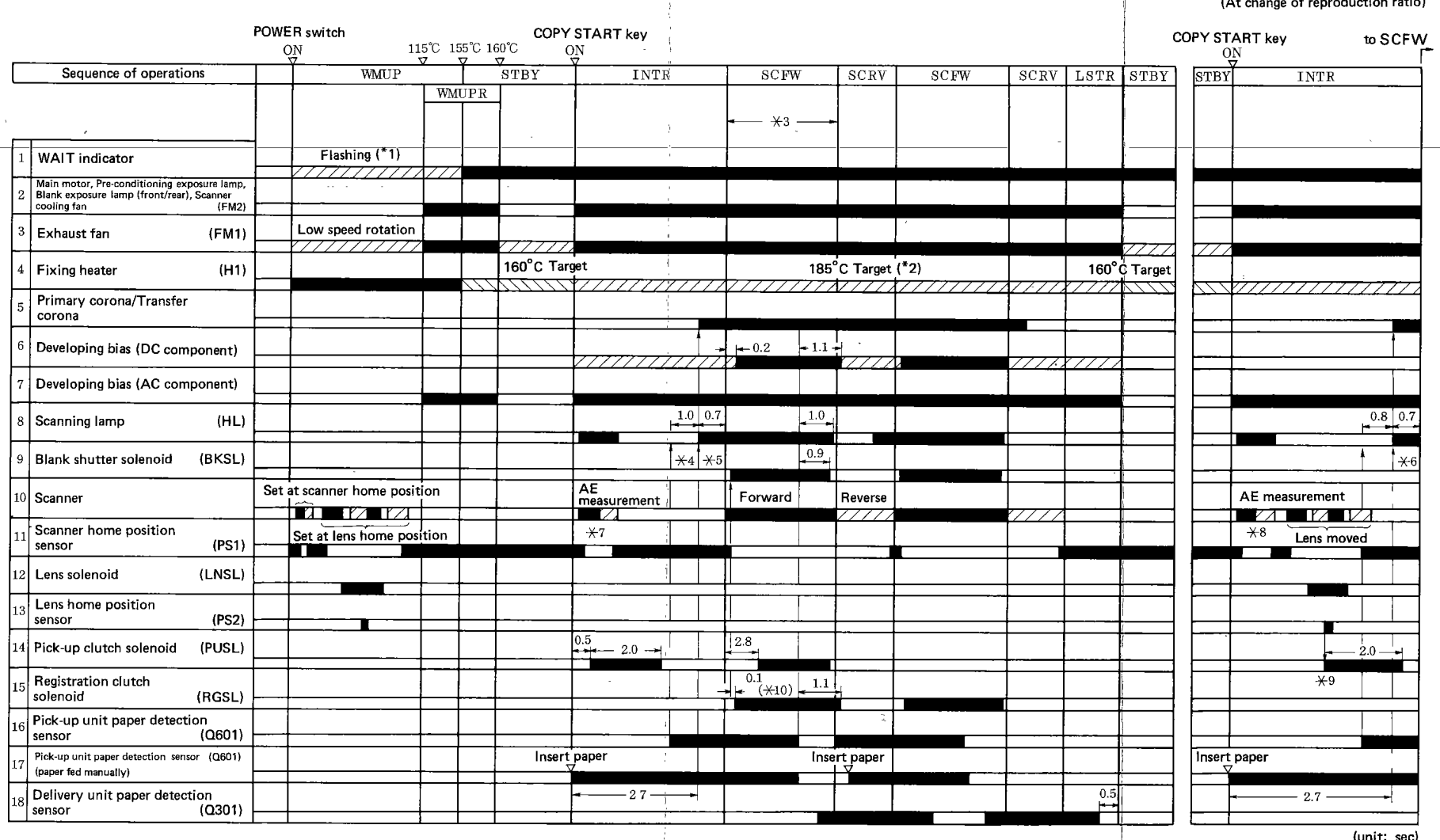
I. GENERAL TIMING CHART

DIRECT, CONTINUOUS COPYING (TWO SHEETS)



(unit: sec)

*1: Pressing the COPY START key during WMUP causes the WAIT indicator to flash fast. When the fixing roller temperature reaches 155°C, INTR starts.

*2: When a monochromatic cartridge is installed, the target temperature is 160°C.

*3: The scanner moves forward at least 297mm (the distance equivalent to the length of A4-size paper); the distance depends on the length of copy paper and reproduction ratio.

*4: Cassette feed.

*5: Manual feed.

*6: When the lens stops moving, the scanning lamp goes ON.

*7: When the AE is OFF, the scanner is not moved, and the scanning lamp does not go ON.

*8: When AE is OFF, the scanner is not moved, the scanning lamp does not go ON, but the lens is moved immediately.

*9: When the paper is fed manually, the pick-up roller clutch solenoid does not go ON.

*10: Variable by VR102. (leading edge registration adjustment)

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II. LIST OF SIGNALS/COMMANDS

This section lists the abbreviations of signals and commands used in this chapter and circuit diagrams, and explains their meanings.

Note:
The abbreviations enclosed in brackets [ ] indicate analog signals, which cannot be represented by '1' or '0'. The others indicate digital signals represented by '1' or '0'.

SIGNAL

ACBON	AC BIAS ON command
BEXP	NON-SCAN (BLANK) EXPOSURE LAMPS LIT command
BKSD	BLANK SHUTTER SOLENOID DRIVE command
COMC 1	COMON CHANGE 1 command
COMC 2	COMON CHANGE 2 command
[DCBC]	DC BIAS CONTROL command
DCVR1	DENSITY CORRECTION VOLUME 1 signal
DDDP	DELIVERY DOOR DETECTION pulse
FMID	FMI (EXHAUST FAN) DRIVE command
FM2D	FM2 (SCANNER COOLING FAN MOTOR) DRIVE command
HTRD	HEATER DRIVE command
HVTON	HVT ON command
LHP	LENS HOME POSITION signal
LNSD	LENS SOLENOID DRIVE command
LRD	LAMP REGULATOR DRIVE command
MMCLK	MAIN MOTOR CLOCK PULSE signal
MMD	MAIN MOTOR DRIVE command
PDP1	PAPER DETECTION signal 1 (Q601)
PDP2	PAPER DETECTION signal 2 (Q301)
PEXP	PRE-CONDITIONING EXPOSURE LAMP LIT command
PUSD	PICK-UP ROLLER CLUTCH SOLENOID DRIVE command
RGSD	REGISTRATION ROLLER CLUTCH SOLENOID DRIVE command
SCHP	SCANNER HOME POSITION signal
[TH1]	FIXING ROLLER SURFACE TEMPERATURE signal
TCNTD	TOTAL COPY COUNTER DRIVE command
TEP	TONER EMPTY signal
WTOF	EXCESS WASTE TONER signal

LIST OF ABBREVIATIONS

INTR	INITIAL ROTATION
LSTR	LAST ROTATION
SCFW	SCANNER FORWARD
SCRV	SCANNER REVERSE
STBY	STANDBY
WMUP	WARM UP
WMUPR	WARM UP ROTATION

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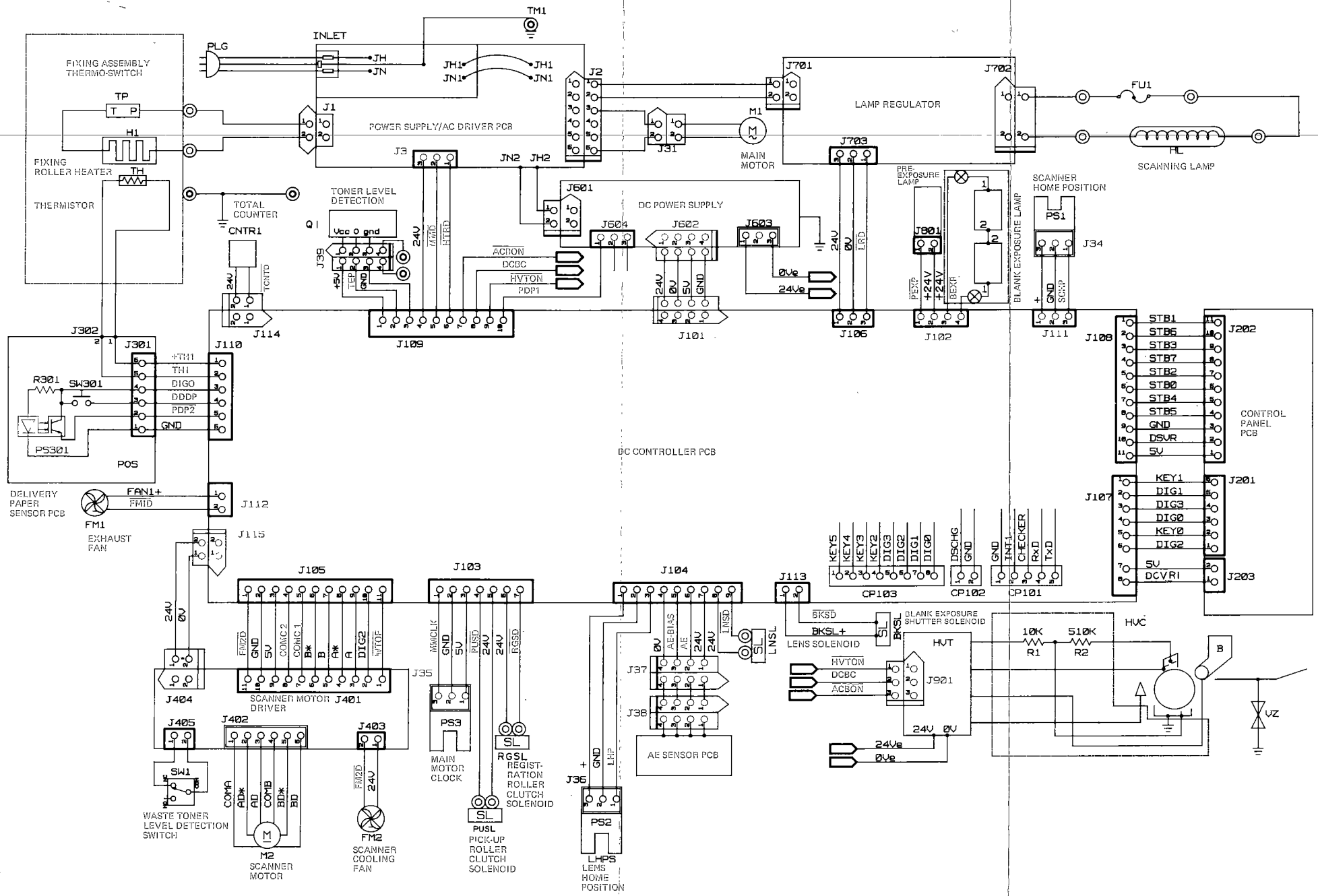
III. GENERAL CIRCUIT DIAGRAM



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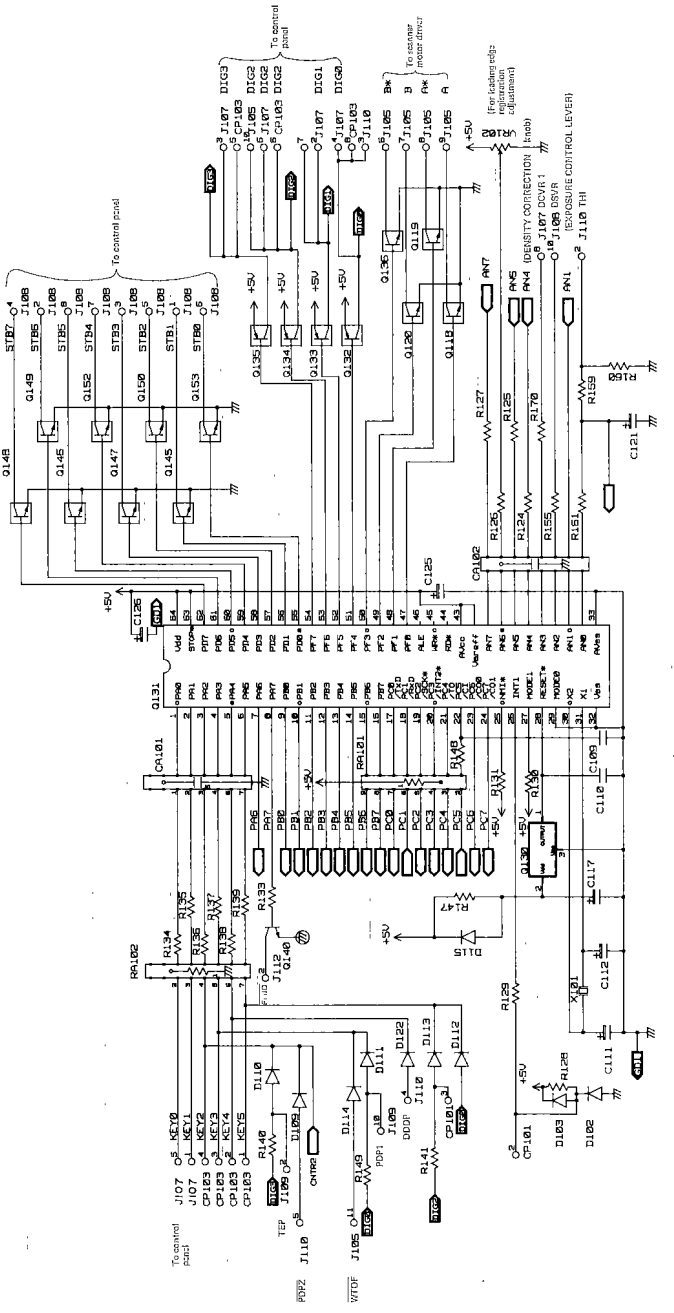
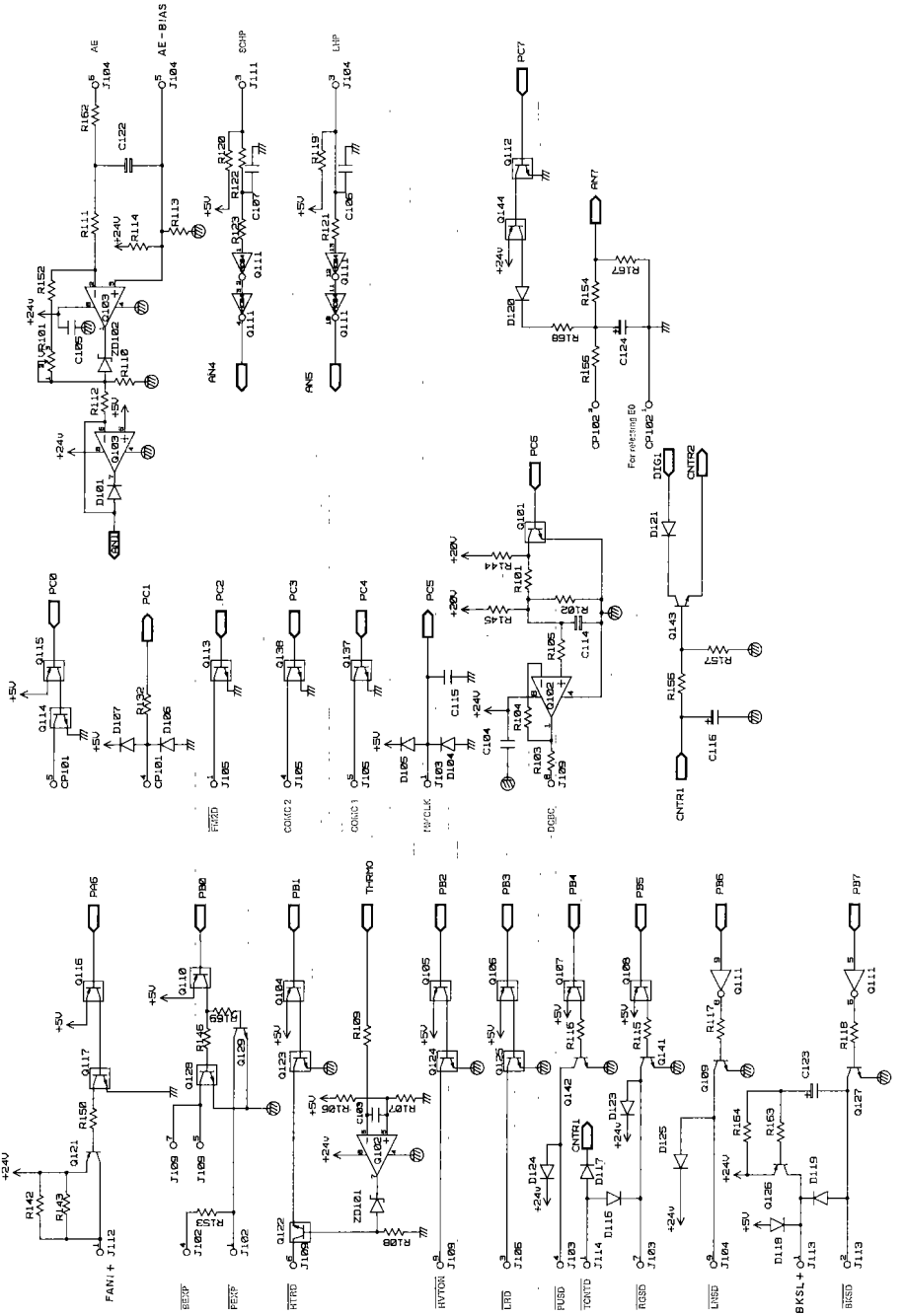
IV. DC CONTROLLER PCB (1/3)



DC CONTROLLER PCB (2/3)



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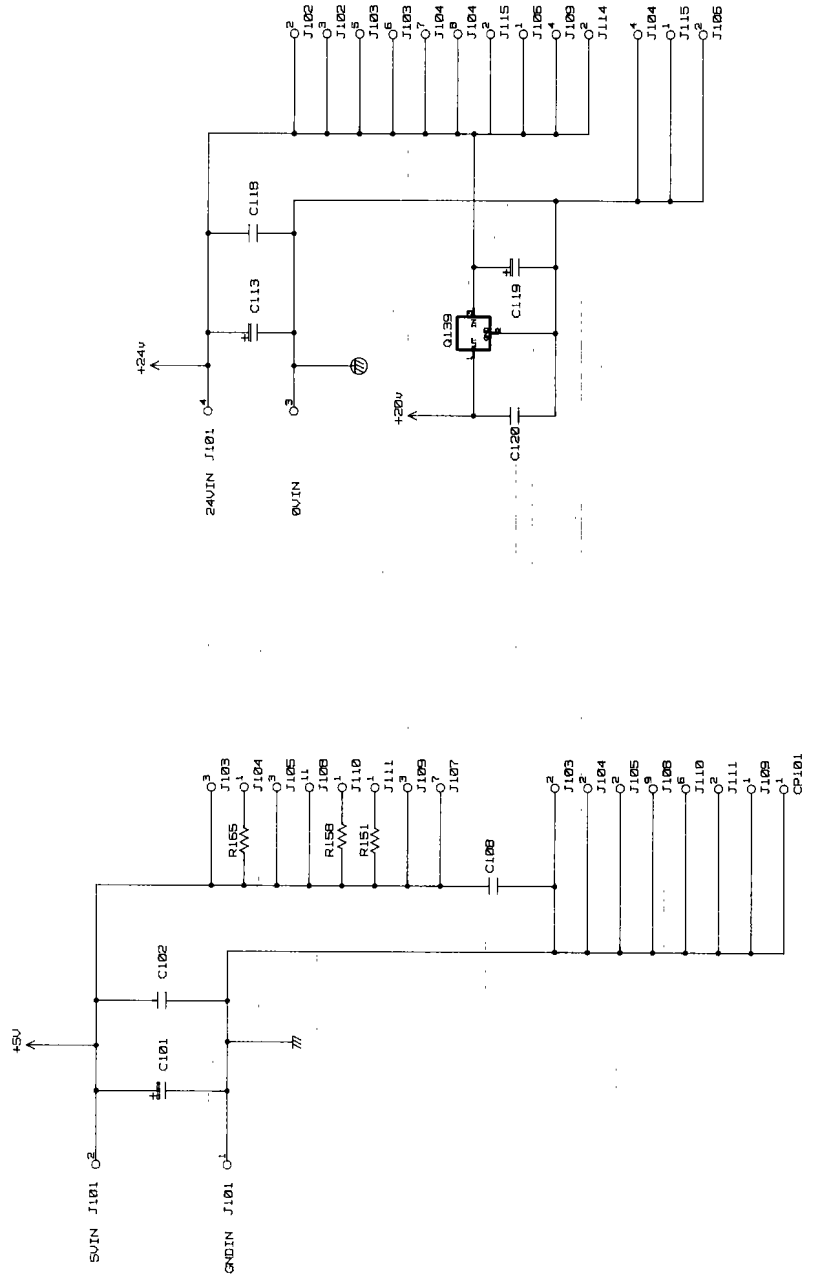
DC CONTROLLER PCB (3/3)



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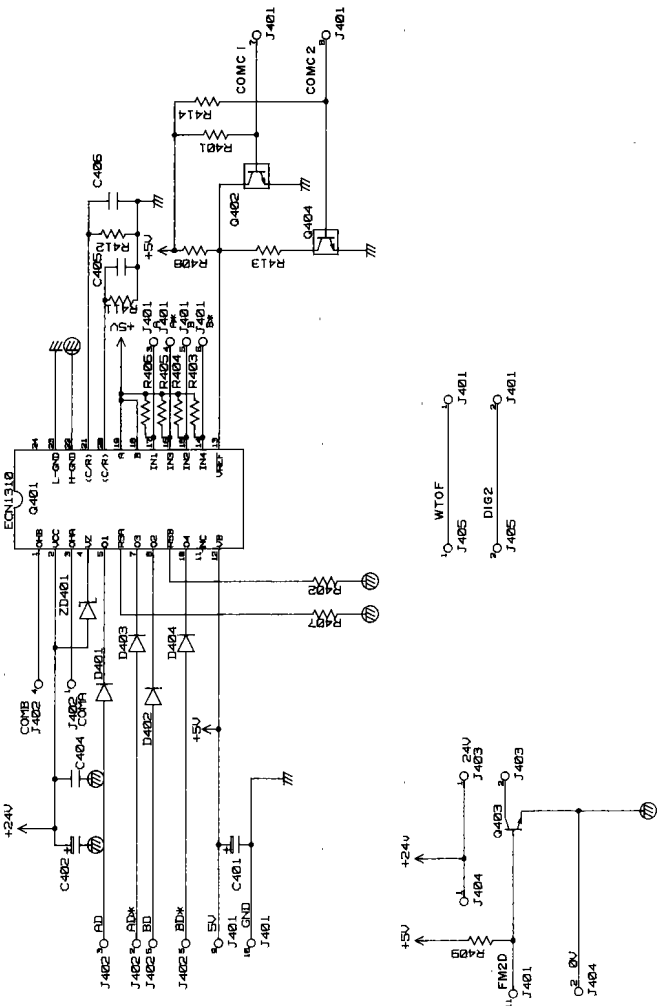
V. SCANNER MOTOR DRIVER PCB



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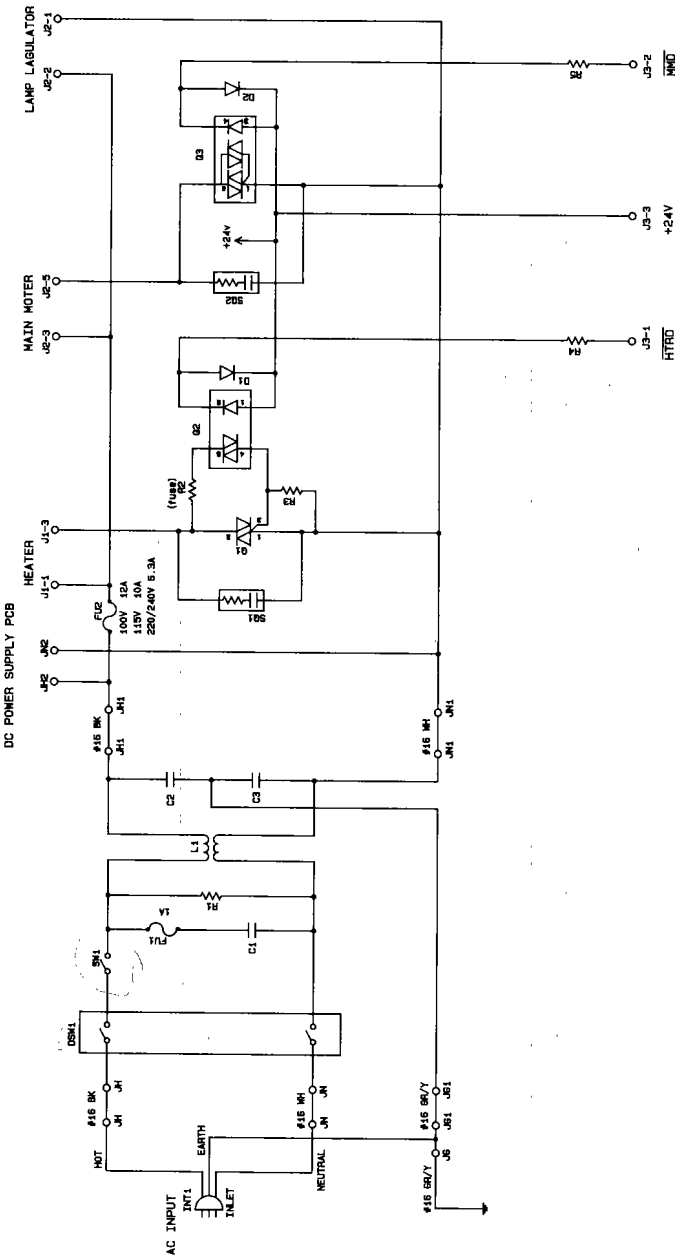
VI. POWER SUPPLY/AC DRIVER PCB



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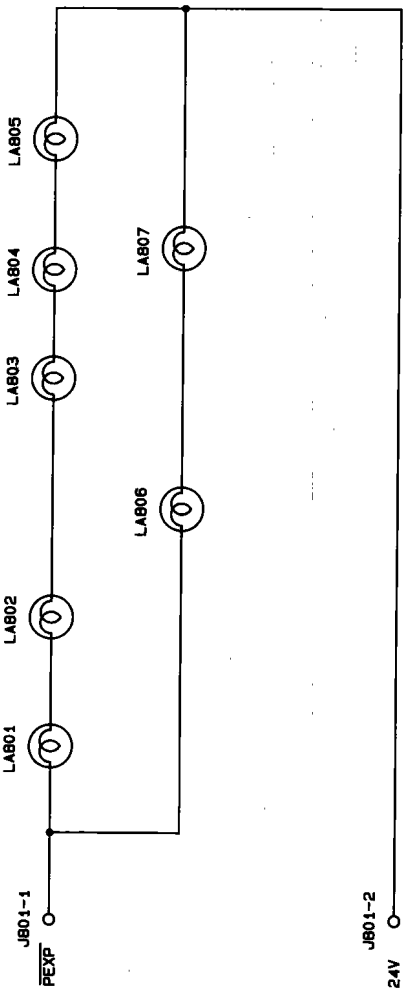
VII. PRE-CONDITIONING EXPOSURE PCB



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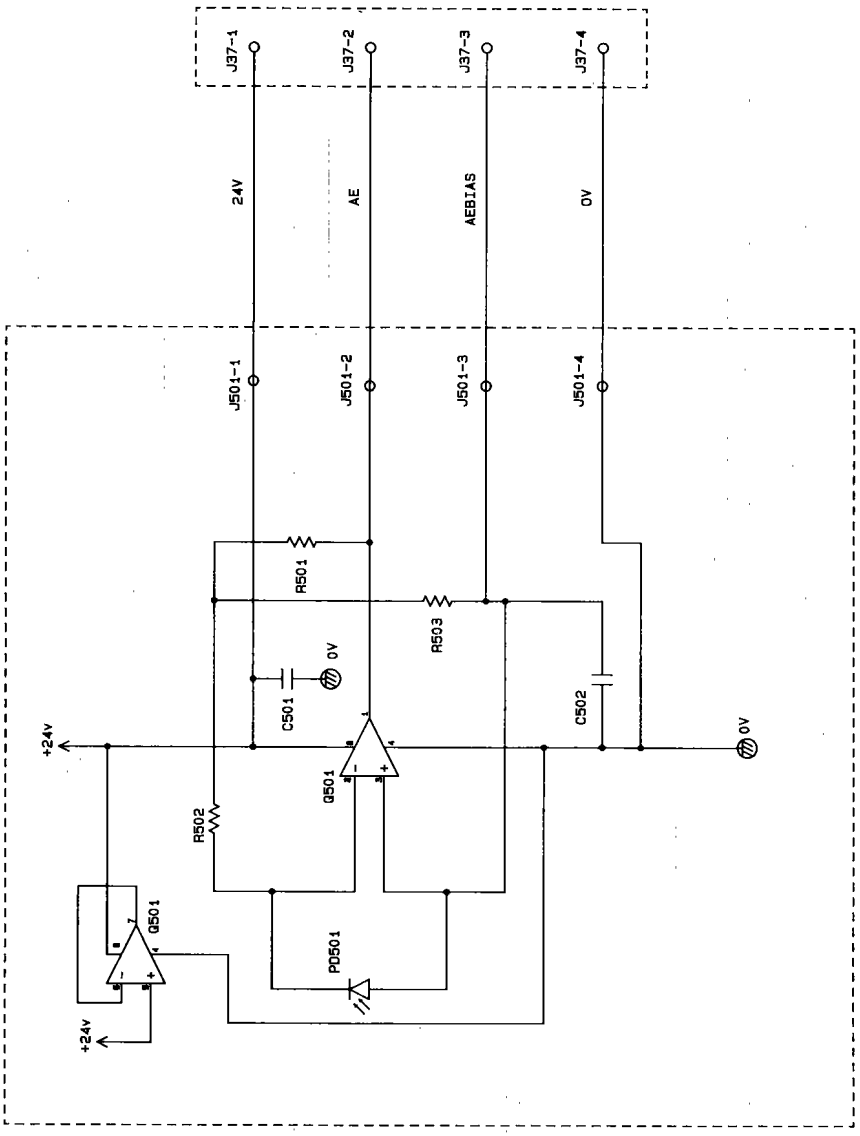
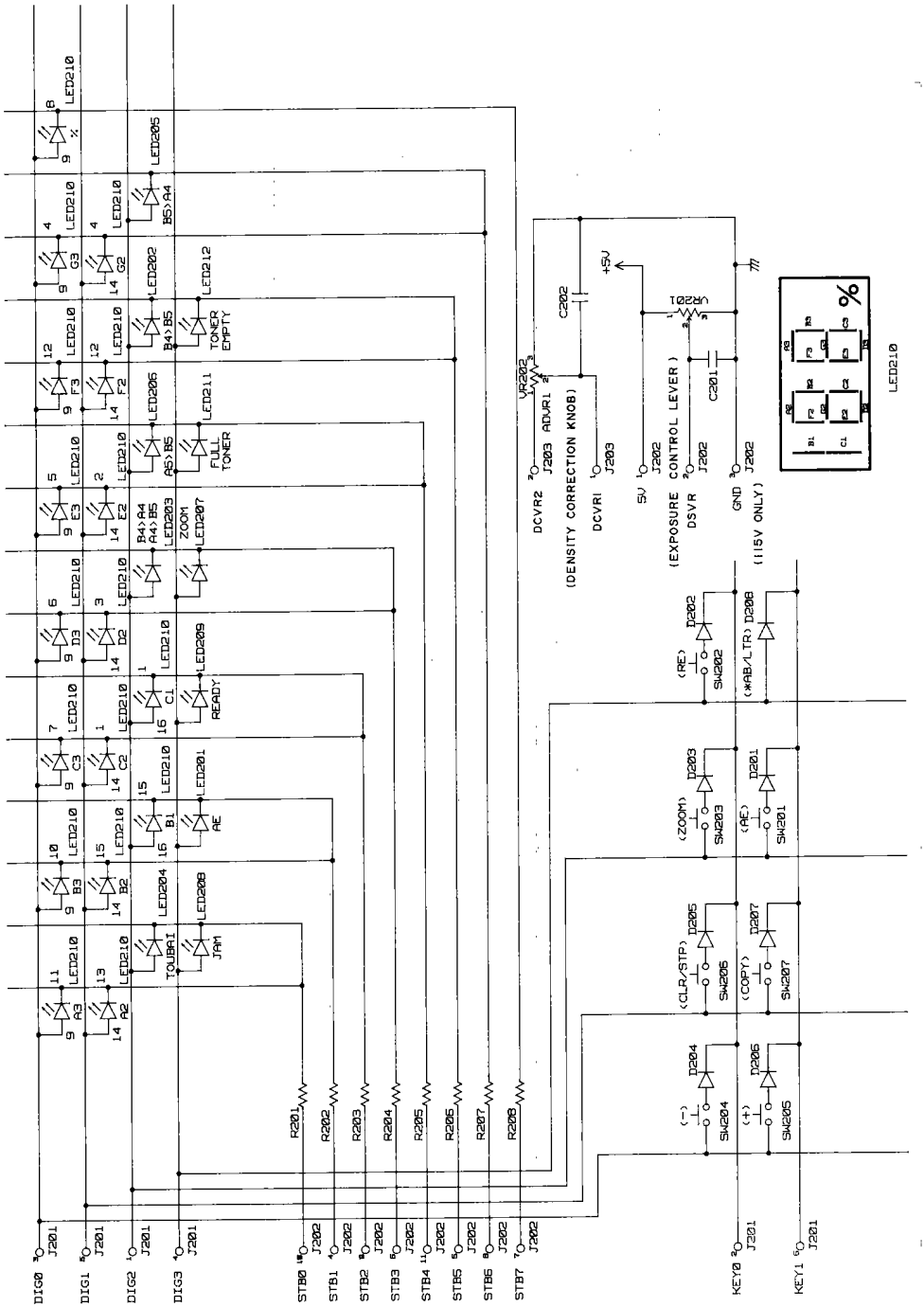
VIII. AE SENSOR PCB



IX. CONTROL PANEL PCB



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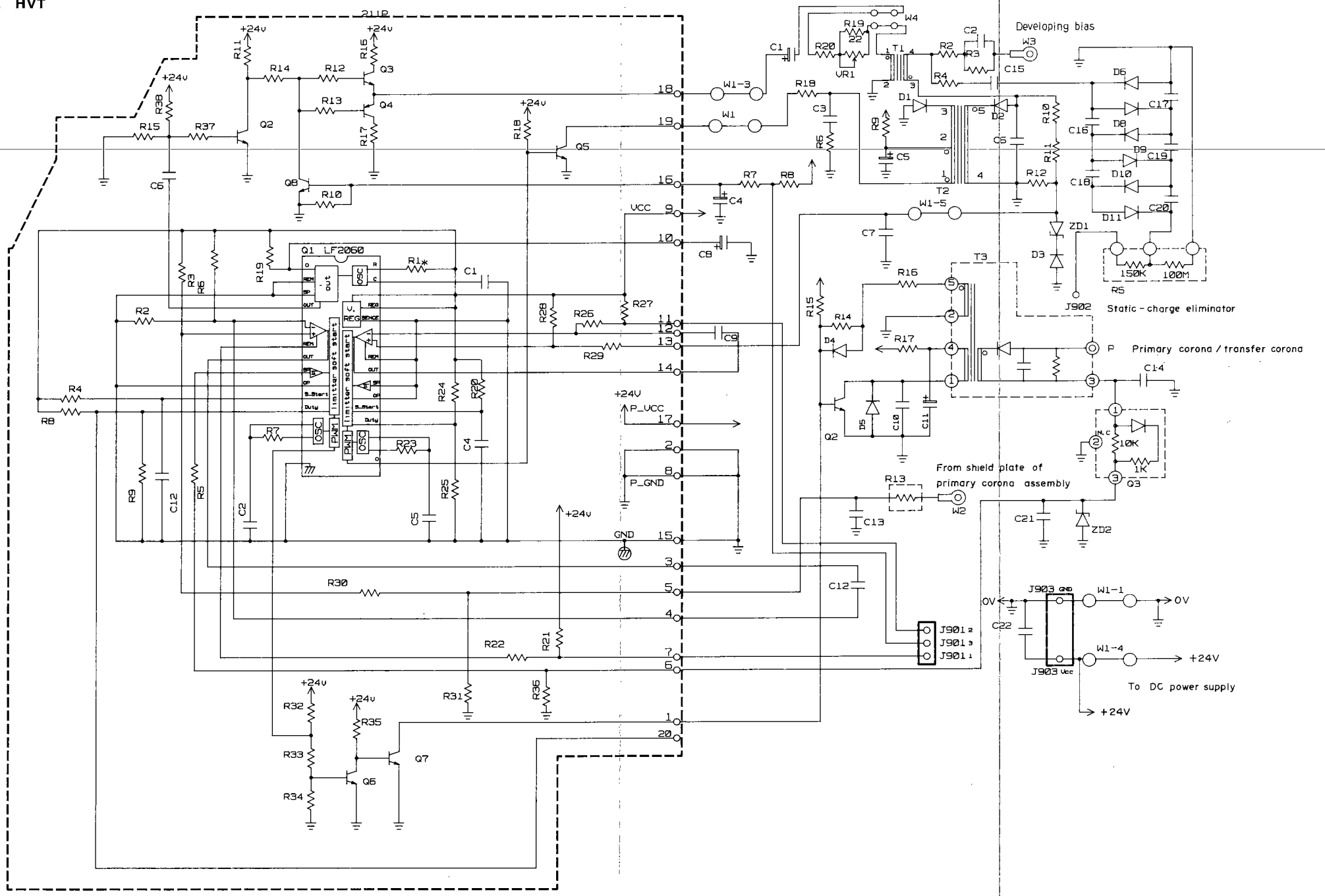
X. HVT



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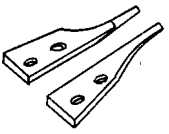
XI. LIST OF SPECIAL TOOLS

Special tools which are required for servicing the copier, in addition to the standard tool set, are listed below.

No.	Tool name	Tool No.	Shape	Code	Application/Remarks
1	Spring scale	CK-0054		B	For measuring strength of cassette springs; 0 - 1500g
2	Extension blades for pliers	CK-0426		B	For removing grip rings; 4 - 9mm
3	Blade gauge (developing assembly)	TKN-0172		B	For adjusting gap between blade and cylinder

Note: Rank

A: Each service technician should carry one.
B: A group of five service techninians should share one.
C: Each service technician should carry one.

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XII. SOLVENTS/OILS TABLE

No.	Name	Application	Composition	Remarks
1	Ethylalcohol (Ethanol) Isopropyl alcohol (Isopropanol)	Cleaning (Example) Glass, plastic, rubber, external covers	C_2H_5OH $(CH_3)_2CHOH$	· Do not bring near fire. · Procure locally. · Substitutes: C1, IPA (isopropyl alcohol)
2	MEK (Example) Metal portions, oil smudges, toner smudges	Cleaning hydrocarbons, chlorine-based hydrocarbon, alcohols	Mineral oil-based	· Do not bring near fire. · Procure locally. · Substitutes: MEK
3	Heat resistant grease	Drive mechanisms	Mineral oil-based lithium soap Molybdenum disulfide	· Vitasol MO-138S manufactured by Hitachi Powdered Metal) · Tool No. CK-0427 (500 g/can)
4	Lubricating oil	Optical system rail	Mineral oil (paraffin-based)	· Uniway 68 (manufactured by Nihon Sekiyu) · Substitute: Suwaway S68 (manufactured by Maruzen Sekiyu)
5	Lubricating oil		Mineral oil (paraffin-based)	· Uniway 220 (manufactured by Nihon Sekiyu) · Substitute: Suwaway S180 (manufactured by Maruzen Sekiyu)

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